Employment and Immigration Canada	Emploi et Immigration Canada

CANADIAN AUTOMOTIVE REPAIR AND SERVICE INDUSTRY

A Human Resource Study

Prepared by

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for the Canadian Occupational Projection System (COPS)

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1.0 EXECUTIVE SUMMARY

1.1 BACKGROUND AND PROJECT OBJECTIVES

This study was commissioned by Employment and Immigration Canada to examine the training and human resource planning needs of the automotive service, repair and parts distribution industry. Because of the technological changes in the industry - in new materials, production processes, emission controls and, most significantly, in electronics - the skills required to service today's vehicles are different to those of 10 years ago. This study profiles the impact of these changes on the automotive service sector, and examines the training requirements for preparing new technicians to meet the needs of tomorrow's market.

A Steering Committee with representatives from the industry - including manufacturers and importers of vehicles, wholesalers, retailers, dealers, independent garages, community colleges, provincial governments, and the federal government - was formed to direct this work, and Woods Gordon was commissioned to undertake the research and analysis. This study presents the results of a research program involving a review of published reports, data and articles on the issues, and interviews with over 200 people from all sectors of this industry conducted between May and December, 1987.

This section presents a summary of the main findings of the report, and the conclusions which have been drawn from them. The main body of the report gives a detailed presentation of the information gathered in this study, and a discussion of the implications of each chapter on the employment, skills and training needs of the industry.

1.2 SUMMARY OF FINDINGS

Industry Profile

- This large and highly fragmented industry, supplied by an ever increasing number of makes and models of vehicles, requires a broad range of knowledge and ability to service and repair both new and older vehicles. The number of automotive suppliers in Canada has grown from 4 major manufacturers to over 30 in the last 20 years. With this proliferation, it is unlikely that an individual can hope to service all customers.

- The number of gasoline service stations has declined rapidly, as has the total number of independent service stations. Manufacturers report that longer warranties are delaying the time when customers will normally visit independent service outlets for their service and repair. Thus, dealers believe that they are handling more of the automotive service business.
- Specialty chains have developed an established position in the service industry, having taken business from other traditional outlets. Much of this 'bread and butter' business which garages relied on is no longer coming to them.
- All garages are facing pressures to invest in expensive new diagnostic equipment to service new vehicles. Smaller outlets cannot cost justify the investment, and may lose business as a result.

Technicians

- There are fewer enrollments in automotive apprentice programs across the country. The poor image of the trade - low pay, poor working conditions, financial disincentives in tool costs, limited career prospects - is not attracting enough people, nor is it thought to be attracting the best young people.
- It is expensive for employers to take on an apprentice, yet the trade needs a steady supply of new entrants. Employers must be encouraged to participate in the program, in order to ensure a supply of technicians for the future.
- The trend over the last 15 years is that there are fewer technicians for every vehicle on the road.
- The demand for technicians will be higher in the future, but there is no guarantee that the people will be there to fill the positions which will be available.

New Technologies

- Traditional technologies still exist and demand regular servicing, at the same time that new technologies are appearing and also require service and repair. It will be at least ten years before traditional technologies disappear and the skills for servicing those older vehicles will no longer be needed. Many technicians are thus expected to be proficient at repairing both old and newer vehicles.
- The area which requires immediate attention as a result of technological change is electronics. The skills needed to handle this new technology are reported to be significantly different from traditional service and repair skills. In the long term, many believe that these developments will make life easier for the service industry, but in the short term, the transition is proving to be difficult for many service outlets to handle.

- Diagnosis of automotive problems is becoming increasingly complex. Many believe that diagnostics will become a specialist skill in the future, performed only by those who have been trained and proven to be competent in this role.
- All jobs in the motor vehicle service and repair sector are expected to become more specialized to some extent, as technicians find it increasingly difficult to keep up with technological changes in all aspects of the vehicle, and for all makes and models.

Training

- There is a wide variety of apprenticeship training program standards across the country, making it difficult for a journeyman licenced in one province to be qualified to practice in another province. Within a province standards also vary. Many see this as limiting the ability of the industry to establish, support and monitor the quality of training received.
- The training of apprentices is the shared responsibility of employers and the colleges. It is not always clear who is responsible for each task in the training program.
- The Red Seal Program has been established to provide a recognized standard of ability across the country. It has not yet achieved wide acceptance and support.
- Many community college training programs are not up to date, making it difficult for apprentices to have the ability to service late model vehicles.
- Many college trainers have not upgraded their skills, and consequently are not able to pass on knowledge about the latest technologies to their students.
- Most colleges are poorly equipped with examples of recent technological developments, to assist in their training. Manufacturers are solicited for donations of parts, assemblies and vehicles, but there are not enough to go around; some colleges are better equipped than others.

Planning for the Future

- There is an immediate need for better trained technicians to service current vehicles.
- There is an urgent need to begin planning for apprentice recruitment and training which will ensure that sufficient numbers of qualified journeymen technicians exist in 5 - 10 years time.
- Because there is no recognized standard or mechanism for advanced training in this industry, there is no accepted method for journeymen to upgrade their skills. Yet some standards of performance beyond the basic licence are clearly being met by many technicians.

- The service and repair industry has not traditionally presented a united and co-ordinated effort to plan for and bring about change in the industry. Most participants, however, share the same concerns and frustrations.

1.3 CONCLUSIONS

From the analysis of the research on this study, several conclusions have been drawn. They are presented here, together with an identification of the constraints on possible solutions, and some initiatives which are suggested by this work.

The Challenge

The industry must find a way to organize itself, in order that a concerted and co-ordinated effort can be made to rectify the problems identified in this study. The organization will demand two planning horizons: one to meet the needs of the short term crisis, to retrain the existing workforce, while the other will need to address the long term needs of the industry for more and better qualified apprentices.

The short term objectives are threefold: to retrain existing technicians, to reduce attrition from the trade, and to attract technicians back from other industries or other countries. Each of these objectives will increase the number of technicians in the trade, and will gradually raise the skill level as well.

The long term objectives must focus on the training of apprentices with skills appropriate to the needs of the industry, not just for today, but for tomorrow. Initiative should be taken to attract the type of person to the trade who will be best suited to it. This is a task not just for the training institutions, but for the employers, who share the responsibilities of training the apprentices. There is also a need to upgrade the curricula of the college programs, and the knowledge of the trainers, to provide the right skills.

Constraints

The constraints which will need to be overcome in order to address the short term objectives include the lack of a positive incentive for technicians to retrain, the cost of retraining, and the lack of qualified trainers. A system will be needed to be introduced in order to reward technicians who do retrain, and encourage others to enroll in programs. The courses will need to be designed to give authoritative training, at appropriate levels, at reasonable times, and without high cost.

The long term plan will need to address the barrier of the image of this trade. New entrants will need convincing that their preconceptions about the trade - poor working conditions, low wages, and poor prospects - are not well founded. In addition, some way to address the disincentive of high tool costs should be found. College courses and their trainers will need to be upgraded, and kept up to date. This will require considerable investment in time and equipment; it will have to be decided whether the demand for training is sufficient to warrant investing in all of the existing college automotive programs, or whether some colleges should get preferential treatment.

Initiatives

In the short term, two initiatives might be undertaken. One is to establish a hierarchy for the trade, to encourage professional development, and allow technicians to progress beyond the initial qualification. This will allow the development of specialists, and of experts in certain fields. The second initiative would complement the first: it requires the introduction of a varied pay scale to reflect different levels of proficiency. This would encourage all technicians to stretch themselves to their limits, and reward those who excel.

There are a number of initiatives for long term planning which emerge from the analysis in this report. The first should be to establish entry standards for apprentices, in order to test the suitability of entrants for the trade, and to raise the calibre of the new entrants. This would address the frequently heard comment that the quality of person entering this trade is not as high as it was, or as it should be. Such standards should be established consistently across the country. Similarly, standards of licencing will need to be set for all provinces, so that the trade can maintain confidence in its minimum level of achievement.

It will be necessary to promote the program and the trade to secondary schools, school boards and guidance counsellors, in order to ensure that the best students consider this trade seriously. This process of changing the image of the trade may require more than just altering perceptions. It may also require that the reality of poor working conditions and low wages be changed as well. Some shops and garages have improved working conditions and are indeed up to date; yet many others in the public eye conform to the traditional stereotype, making any change in the public's perception difficult to achieve.

Not only must the colleges address the upgrading of the classroom portion of the apprentice program, but the employers must take on their responsibility to perform the 'hands on' training for apprentices. The duties of both the colleges and the employers should be defined clearly, and both parties must be encouraged to take their responsibilities seriously.

One of the realities of the trade which could be altered is the inability of apprentices and journeymen to write off their investments in tools against taxes. The industry could lobby the federal government for tax relief from this substantial expense.

The industry needs to develop a mechanism for the continued liaison between trainers, manufacturers, dealers and other segments of the industry. This would be concerned with training the trainers, sharing information and the distribution of equipment. All these tasks require input from the industry to the colleges on a timely and continuing basis; whatever mechanism is adopted will need to have the ability to take action quickly.

Trainers complained that the automotive departments are low on the list of priorities for investment by the colleges. It will be important to raise the profile of the automotive trades with each college, so that this trade gets sufficient funding and support. This will be vital in upgrading the colleges' equipment for the automotive programs.

Because support for the colleges' motor vehicle apprentice programs is limited, some method will need to be designed to allocate those resources which are available. It may be that, with constraints on donations from manufacturers, and on the funds from government, it will not be possible to support all the programs which presently exist. It may be appropriate to identify some of the existing colleges as "Centres of Excellence", which will receive the available equipment and funds for upgrading. This would be an economic solution to the shortage of funds, and would guarantee that at least these centres would be in a position to provide up to date training for apprentices.

2.0 INTRODUCTION

This report was commissioned by the Steering Committee convened to address the problems of human resource planning in the automotive service and repair industry.

2.1 TRENDS IN THE AUTOMOTIVE INDUSTRY

This study set out to profile the problems being experienced by companies involved in the automotive service, repair and parts distribution industry. For some time, automobile manufacturers and service companies have been discussing growing problems in the supply of qualified mechanics and body repairers to service new model cars. The technological changes which have been taking place in recent years have changed the skills required of service personnel, yet there have been no major changes to the training of personnel in the industry.

At the same time there has been growing competition in the North American car industry between the domestic manufacturers and the importers of foreign cars, from Europe and the Far East. The growth of sales of imports has demanded a corresponding growth in the service networks provided to support these sales. The demand for automotive mechanics, therefore, has remained strong for several years.

2.2 INDUSTRY CONCERNS

In spite of this high demand for service personnel, the ability of this trade to attract and retain skilled people has not been good. Manufacturers, dealers and employers of technicians believe that there has been a steady flow of mechanics out of the automotive service sector into other industries. Reasons suggested for this include: the low wages for mechanics relative to other trades, the poor image of the trade among high school students (and the public in general), and the inability of mechanics to improve their positions without going to another industry.

In addition to this strong demand for technicians, there has been a concern that the technicians who are available to work do not have sufficient skills to serve the needs of the market. The industry is not clear how to address the challenge of up grading the skills of already qualified technicians.

2.3 REASON FOR THIS STUDY

These trends have been observed for some time. In 1986, a number of industry representatives approached the Canada Employment and Immigration Commission (CEIC), asking for assistance in addressing these issues. In May of 1987, the Minister of Employment and Immigration, the Honourable Benoît Bouchard, announced funding of research. A Steering Committee of industry, government and community college representatives was formed (members are listed in Appendix 1) and the management consulting firm Woods Gordon was appointed to investigate the problems of the industry on behalf of the Steering Committee.

2.4 OBJECTIVES

There were three primary objectives of the study.

1. To determine the impact of technological change on the skill requirements of those working within the industry (specifically mechanics/technicians and others in the service and auto parts distribution trades);
2. To determine a view of future levels of employment for mechanics/technicians and others in these trades, and determine whether or not a sufficient pool of human resources will match future needs;
3. To enhance the decision making process concerning governmental and non-governmental policies and programs regarding human resource issues facing the automotive service, repair and parts distribution industry.

Information has been gathered and analyzed in order to provide a background for decisions about the numbers and quality of people entering and working in the automotive service and repair industry, and the training appropriate for the industry of the 1990's and beyond.

2.5 METHODOLOGY

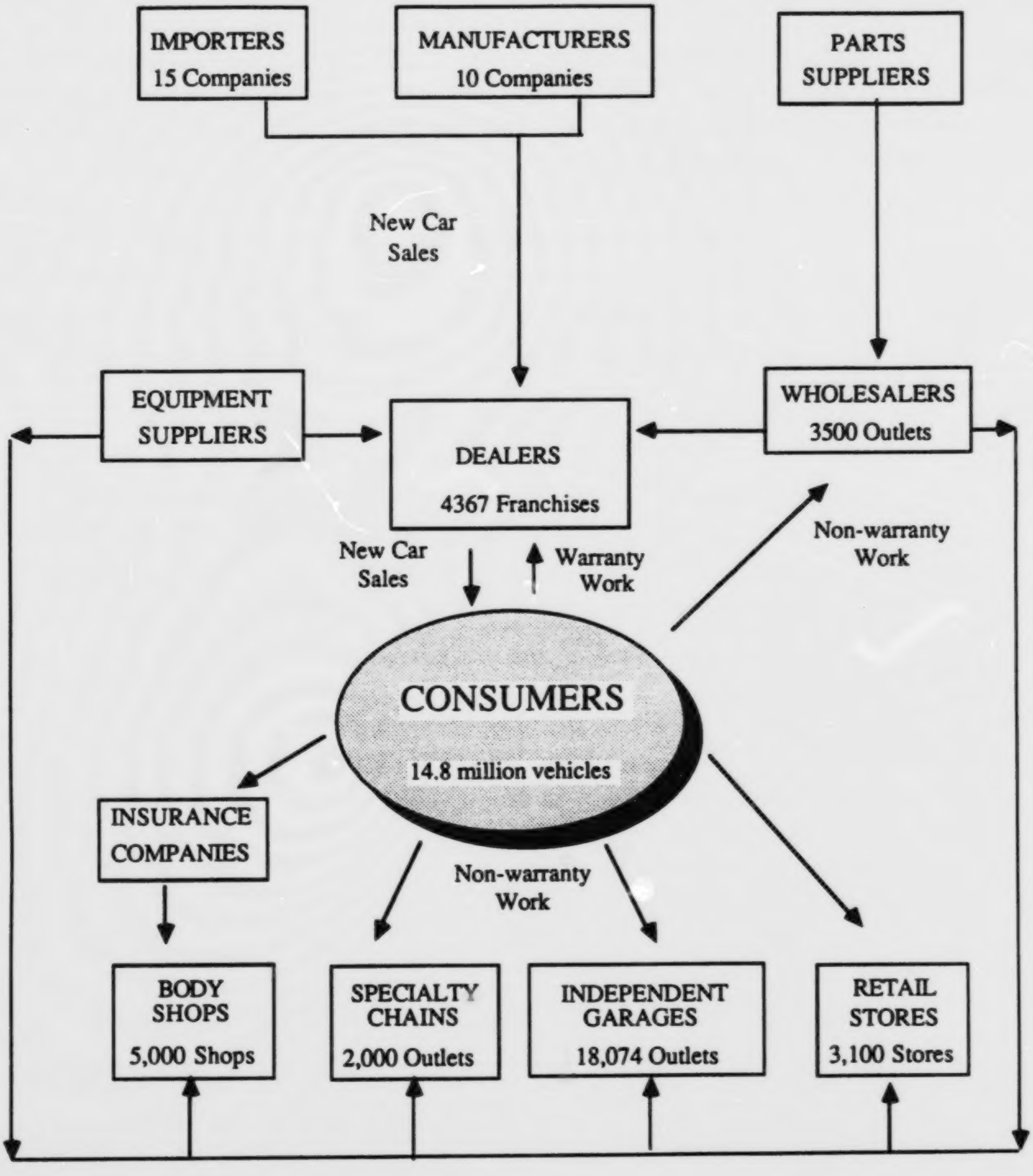
The research for this project was conducted between May and December, 1987. A thorough review was conducted of the many reports which have already been written on different aspects of this issue, through the provinces, the trade associations and the various participants in the industry. A considerable amount of data was gathered from Statistics Canada and Employment and Immigration Canada on historic trends in the industry, relating to the numbers of people involved, the numbers of enterprises operating in the industry, and the level of business undertaken.

A substantial interview program was completed, involving personal interviews with many people concerned with this problem. A series of 21 focus groups was set up to hear first hand the concerns of mechanics, garage owners, dealers, body shop repairers, college trainers and apprentices from across the country.

Other sectors of the industry which were contacted and interviewed include automotive manufacturers, importers, wholesalers, specialty chains, parts suppliers, body shops, community colleges, provincial ministries, Provincial Advisory Councils, Employment and Immigration Canada, and numerous other interested individuals and organizations who took the time to assist the Committee in this work. A complete list of people who participated in this project can be found in Appendix 2.

The project team is grateful for the very generous support given by all members of this industry, and by members of CEIC and community colleges. Woods Gordon has been impressed by the level of concern and involvement throughout the automotive industry, a measure of the importance of this topic for all participants in the automotive service sector.

Exhibit 3.1
Automotive Service and Repair Industry


IMPORTERS
15 Companies
MANUFACTURERS
10 Companies
PARTS
SUPPLIERS
New Car
Sales
EQUIPMENT
SUPPLIERS
DEALERS
4367 Franchises
WHOLESALERS
3500 Outlets
New Car
Sales
Warranty
Work
Non-warranty
Work
CONSUMERS
14.8 million vehicles
INSURANCE
COMPANIES
Non-warranty
Work
BODY
SHOPS
5,000 Shops
SPECIALTY
CHAINS
2,000 Outlets
INDEPENDENT
GARAGES
18,074 Outlets
RETAIL
STORES
3,100 Stores

3.0 INDUSTRY PROFILE

This chapter presents a profile of the automotive service and repair industry. The first section gives an overview of the industry, outlining its structure, shape and growth over the last five years, based on data collected from federal and provincial sources, and from the appropriate trade associations. A short profile of each of the sectors is presented, and a summary and discussion of the implications of these findings follows.

3.1 OVERVIEW

3.1.1 Structure

Exhibit 3.1 opposite gives an overview of the structure of the industry. While the sale of new vehicles is handled in a direct way between the manufacturers and their dealer networks, the after-sale service of those vehicles is less well defined, with many different types of outlets for the consumer to choose from. The industry is fragmented, both in terms of the kinds of enterprises and their geographical location. Because of the variety of makes and models, and the broad range of services on offer, there are a great number of retail outlets in the country. The chart lists dealers, independent garages (including service stations), body repair shops, retail outlets, specialist chains, and wholesalers, each offering the consumer a slightly different service.

Service work is divided into that portion which is covered by warranty, going to the dealers, and that work not covered by warranty, spread among all service outlets (including dealers). The increasing warranty periods have a tendency to tie consumers to dealerships longer than they have in the past.

There are over 18,000 independent service outlets (including gas service stations) in Canada; this is more than four times the number of dealer franchises, and larger than the total number of all other retail service outlets combined. However, this group accounts for about 45% of the number of licenced technicians. Dealerships employ about 34,000 technicians, about 30% of qualified technicians in the workforce. Specialist chains, such as muffler stores and transmission shops, hire very few licenced technicians.

Most body shops are also independent of the manufacturers. The majority of their business comes through insurance companies, acting as intermediaries between the consumers and those who provide the service. Insurance companies set rates for work, and provide references for some shops.

The service industry also has a number of outlets which have diversified from traditional product sales. The parts wholesalers have traditionally served the aftermarket as warehousers and distributors. Some, however, have established service bays as well, particularly in areas not served by many retail outlets. The retail chains, such as Canadian Tire Corp., Sears and Woolco also provide service in addition to the retailing of parts. Both the wholesalers and the retailers have fewer outlets than the independent garages or dealers, but still provide a significant amount of service.

Vehicle manufacturers are a direct source of information and expertise for the dealers. This source does not exist for the other 70% of technicians who work in independent outlets, either as mechanics or body repairers. These technicians must rely on warehouse distributors and wholesalers to act as intermediaries in the transfer of information.

3.1.2 Industry Trends

The automotive industry in Canada has experienced a strong recovery since the 1981-82 recession, as shown in the table below. Vehicle production in this country has grown at an average annual rate of 15.4% since 1982. Sales have also risen dramatically, and revenues from the sales of automobiles have doubled in real terms since 1982, after a fairly flat growth throughout the 1970's.

Exhibit 3.2

Canadian Automotive Industry Production and Sales

	1981	1982	1983*	1984	1985
Vehicle Sales (000's)	1,191	920	1,081	1,283	1,530
Vehicle Production ('000's)	1,280	1,236	1,502	1,830	1,900
Value of shipments: (Current $bn)	16.9	18.4	23.9	32.7	38.0
(Constant 1984 $bn)	19.4	19.7	24.4	32.7	39.0

*1983 data have been adjusted to account for a change in SIC classification.

Source: Statistics Canada, Canada Consulting Group

In spite of this growth in the automotive industry, competition has been increasing, as more and more manufacturers are producing more and more models for the North American market. This means that service sector personnel have a greater number of different products about which they must have knowledge.

The increase in the number of manufacturers has required the establishment of new dealer networks, which has required more technicians. Interviews with manufacturers revealed that there is no major expansion of any dealer network anticipated. In spite of the growth of new networks, the total number of dealer outlets has not increased since 1980, as shown in the table which follows.

Exhibit 3.3

Numbers of Automotive Service Outlets, 1980 - 1985

	1980	1982	1984	1985
Vehicle Dealers	4,488	4,294	4,160	4,438
Service Stations	13,790	11,368	6,391	7,023
Garages	10,080	10,576	11,696	11,051
Total	28,358	26,238	22,247	22,512

Source: Jobber News, MVMA

There has been a substantial change in the relative numbers of independent garages and service stations. Petroleum companies have reduced the number of full service outlets in their networks by 50%, and have built gas bars in their place. The number of other independent garages has grown slightly, perhaps replacing some of the service stations. The total number of service outlets declined almost 20% between 1980 and 1985.

At the same time that the number of outlets has been falling, the number of vehicles registered in Canada has been growing, at a rate faster than the overall population. In 1971, there were almost 7 million vehicles registered, one for every three people in the country. By 1985, the number had grown to 14.8 million registered vehicles, which is one for every 1.7 people. Statistics Canada reports that over 82% of Canadian households have at least one vehicle. This high level of penetration is unlikely to increase substantially. This argues the need for manufacturers to battle for market share by retaining the customers they have, as there will be less opportunity to find new ones.

Almost 60% of the vehicles on the road in Canada are registered in Ontario and Quebec. This requires a similar concentration of service and repair outlets in these provinces, to support this market.

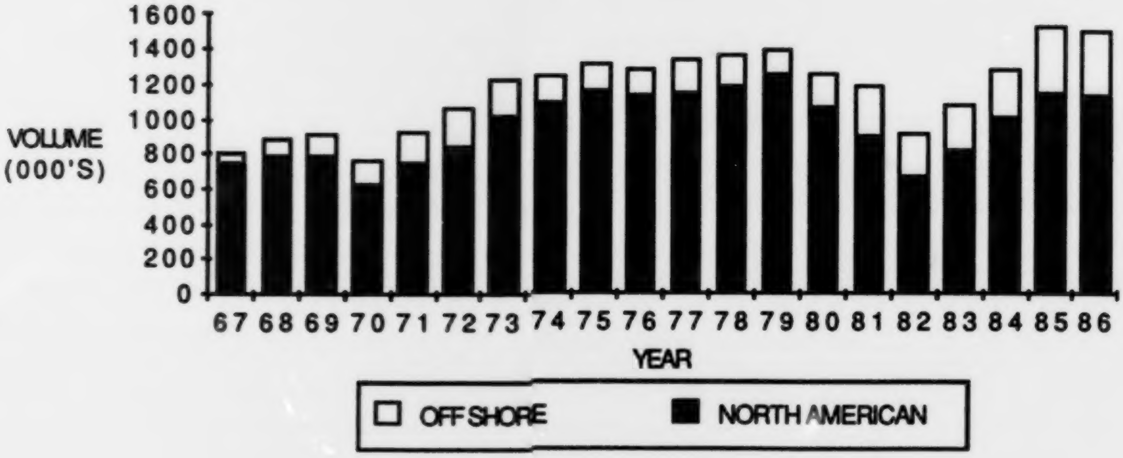
The following sections of this chapter give short outlines of the five major sectors in this industry, as background to the discussion of issues which follows.

3.2 MANUFACTURERS

There are over 30 suppliers of motor vehicles in Canada, either as indigenous manufacturers or as importers of vehicles. Exhibit 3.4 below shows the sales of new motor vehicles in Canada over the last 20 years, and highlights the changing shares of these groups. There has been a significant growth in the number of foreign suppliers to the Canadian market, and their sales now account for a large proportion of the market.

Exhibit 3.4

NEW MOTOR VEHICLES SALES
IN CANADA, BY ORIGIN



Source: Motor Vehicle Manufacturers Association

This shift in the market has had two effects on the service and repair sector. The first and most obvious one is the increasing demand for technicians to serve these new suppliers. For the last few years, there has been sufficient demand for technicians to provide a job for every mechanic who wanted to work in this trade.

The second effect has been a proliferation of new makes and models of vehicles, each with individual design features to differentiate them. The result has been that technicians are finding it difficult to keep up with all new developments. It is more difficult to remain a generalist in these conditions; many technicians end up specializing in some area.

The increased competition has encouraged manufacturers and importers to find new ways of differentiating their products and attracting customers. This has been most evident in two areas: new technologies, and production economies.

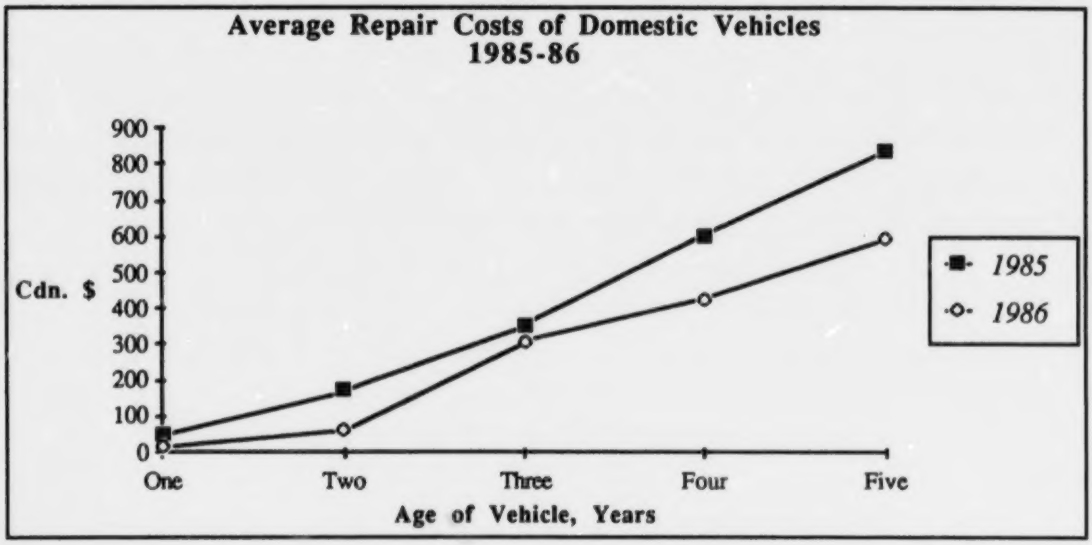
3.2.1 New Technologies

The thrust of new technologies has been to improve the vehicle's performance, getting it to go faster or farther and more safely, using less energy and producing lower emission levels. Fuel economy has encouraged the introduction of lighter materials in car bodies and engines. The efficiency from better controls has brought electronics to almost every part of the vehicle.

Very few fundamental changes took place in vehicles until the 1980's. In the last five years, however, major changes have occurred in the drive train, the braking systems, suspension, and fuel injection systems. All of these changes have demanded that those responsible for servicing vehicles learn to perform tasks in a way completely different from their traditional approach.

Technological change has had an effect on the cost of vehicle repair. In 1985 and 1986, the Canadian Automobile Association surveyed members on the amount they had to spend to repair their cars over 12 months. The results were tabulated according to the age and nationality of the vehicle. Some results of this survey were analysed by DesRosiers Automotive Research, and published by the AIA Aftermarket Watch. Two graphs are presented on the next two pages, based on this material. The data shows the average charges to customers; it does not include repairs included under warranty, nor does it include the costs of the warranty itself. Exhibit 3.5 shows the changes for domestic vehicles, and Exhibit 3.6 shows the changes for Japanese vehicles.

Exhibit 3.5

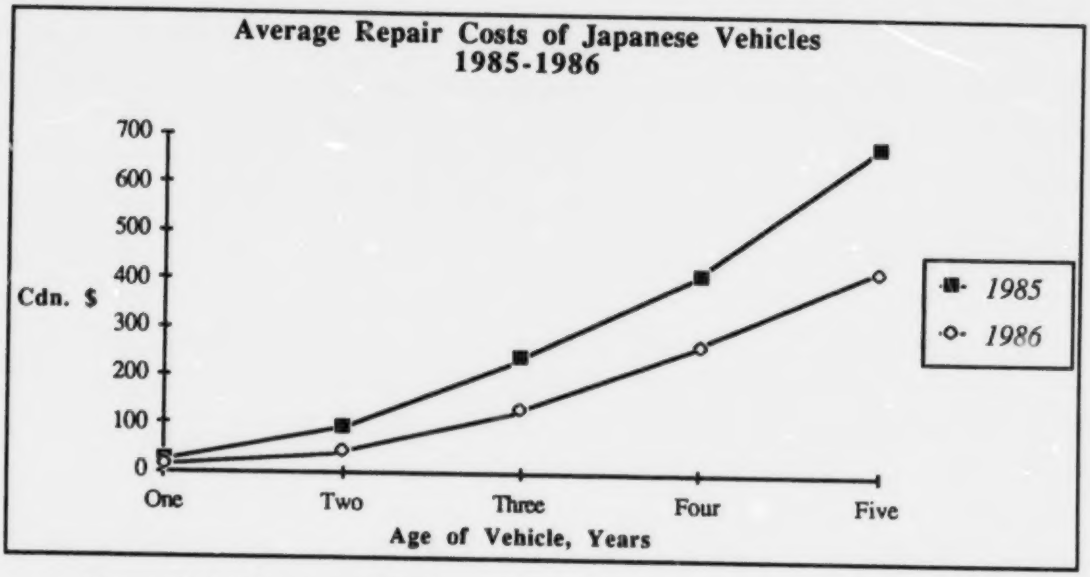


Source: AIA Aftermarket Watch

This graph shows that the consumer is having to spend less, on average, over and above the warranty costs. While there is a steady increase in the costs as the vehicle gets older, costs were not increasing as quickly in 1986 as they did in 1985. This data covers only two years, but indicates a trend which manufacturers report has been taking place for much longer.

In comparing expenditures on 5 year old vehicles, both domestic and Japanese manufacturers have reduced costs by 25 - 30%, a saving of over $250. Technicians say that manufacturers have reduced the frequency of repairs in newer cars, but that the cost of each repair has risen. Manufacturers believe that the net effect will be a saving for consumers overall.

Exhibit 3.6



Source: AIA Aftermarket Watch

3.2.2 Production Economies

Part of the competitiveness between manufacturers has been concerned with the ability to offer lower priced vehicles. In order to do so profitably, manufacturers have had to get their costs down. This has been accomplished in a number of ways: by making the manufacturing process more efficient; by subcontracting component assembly; and by sharing product development costs with their suppliers.

The process of 'design for manufacture' has made the production process more cost effective. It has in some cases, however, made life more difficult for the service sector. An engine which has been designed for a streamlined production process may make relatively mundane repairs very difficult. There was a report of a bill for $600 for replacing a starter motor; it was this high because the technician had to remove the entire engine in order to get at the starter.

The contracting out of sub-assemblies in some cases encourages the development of sealed units. If some part of the unit requires repair, however, it is easier to replace the whole unit rather than try to take it apart, incurring greater costs to the customer.

All these developments have the potential for causing difficulties for the service sector. The fact that a great number of changes are appearing at the same time compounds the problem, and makes it very difficult for technicians to keep up with changes in the industry.

3.3 WHOLESALERS

In addition to the manufacturers, importers and assemblers of vehicles, there are a number of establishments wholesaling parts and accessories to different types of retail outlets. Because the Canadian market is so small, yet spread over such a large area, wholesale outlets are needed in each region to make the distribution of parts and accessories efficient and timely. There are about 3,500 wholesalers of automotive parts and accessories in Canada, employing almost 47,000 people. This sector has grown by over 20% since 1981, a stronger growth than that for the industry as a whole. The following table (Exhibit 3.7) gives the growth of this sector since 1981.

Exhibit 3.7

Wholesale Trade of Motor Vehicles and Accessories in Canada

	1981	1982	1983	1984
Number of Establishments	2536	2470	2853	3449
Number of Locations	3825	3794	4281	4996

Source: Statistics Canada

Wholesalers are finding that they are increasingly required to act as advisers to technicians who call to order parts. The technicians do not know all parts by name, and often describe the problem to the wholesaler, to get a diagnosis and the identification of the parts required. This demands more knowledge than might normally be required of counterpeople.

Wholesalers and warehouse distributors are being squeezed by both ends of the industry for the holding of inventory. Neither the manufacturers nor the retail outlets want to hold inventory, and are demanding that wholesalers keep high stock, in order to fill orders quickly. This constrains the profitability of the wholesale business, by increasing the inventory costs.

A number of wholesalers also act as service centres, repairing vehicles for clients in rural areas where other service outlets are hard to find. This may develop into a substantial part of their business.

3.4 DEALERS

There are two trends among dealers which have had a significant impact on the hiring of qualified technicians. The first is the change in the number of dealer outlets, and the second is the increasing proportion of dealers serving importers rather than domestic suppliers.

About 10% of dealers operate more than one outlet; the total number of outlets run by dealers in Canada reached a high in 1981 of 4,533. Following the recession of 1981-82 the number of dealer outlets dropped to less than 4,000, but has almost recovered to its 1981 level, as shown in the table below. This fluctuation in the growth of outlets reduced the demand for mechanics early in the 1980's, and increased the demand in the last few years. These shifts may have influenced the number of apprentices entering the trade, and the number of trained technicians attracted to other industries. As outlets closed in 1981-82, there would have been a substantial number of trained technicians available for work, reducing the demand for new recruits; many of these would have had to find jobs outside the automotive service industry. As new outlets opened in more recent years, the demand for technicians increased, offering employment for those who were looking for work, and encouraging young people to enter the trade.

Exhibit 3.8

Numbers of Motor Vehicle Dealer Outlets in Canada, 1981-1986

	1981	1982	1983	1984	1985	1986
Importers	1,387	1,421	1,372	1,531	1,617	1,593
Domestic	2,765	2,458	2,332	2,424	2,447	2,447
Total	4,152	3,879	3,704	3,955	4,064	4,040

Sources: AIC, MVMA

The number of outlets handling imported vehicles has increased slightly faster than the overall average; in 1981, importers accounted for 33.4% of dealers, but by 1986, they represented 39.4% of the outlets. As was mentioned in the previous section on manufacturers, the increasing sales of imported vehicles has meant that service and repair technicians have not found it sufficient to be trained only on domestic model vehicles. While there were no technologies which were identified as appearing only on imports, technicians felt that there were differences in design and construction which demanded an awareness which could not be learned on domestic vehicles.

Exhibit 3.9
Motor Vehicle Dealers - Operating Data

	1983	1984	1985	1986
Annual Sales ($million)	17,198	20,846	26,026	28,688
Total Employees	74,300	78,700	81,400	96,300

Source: Statistics Canada

In Exhibit 3.9 above, the total number of employees for dealerships represents all sales and administrative staff, as well as technicians and their support staff. There is no reliable data on the numbers of technicians employed in dealerships, but dealers suggest that between 30 and 40% of their staff are licenced technicians. This would place the total number of technicians at between 29,000 and 38,000 in 1986; a 'best estimate' suggests that there are about 34,000 technicians employed in dealerships.

It is estimated that dealers obtain the vast majority of their revenues from the sales of new vehicles. Statistics Canada reports that in 1985, dealers had sales of $26.0 billion; of that, Statistics Canada estimates that $25 billion came from new car sales, and only $1 billion was from service. This implies that the focus of their work is less on the service sector, and more on car sales.

Dealers have noted the trend of customers to move to independent garages once the new car warranty has expired. Dealers and manufacturers agree that the evolution of longer warranties - now as long as 7 years - has the effect of keeping customers with the dealership for a longer portion of the life of the car. This increases the proportion of the service work done by dealers, and reduces the work to be done by the independent sector.

3.5 INDEPENDENT GARAGES

The number of independent garages in Canada is difficult to identify, primarily because these companies are small independent businesses which may be earning less that the level required to ensure reporting to Statistics Canada. This group includes independent gasoline service stations, some independent specialists, such as transmission shops and body shops, and general garages.

There has been a concern voiced by a number of industry experts that the trends seen occurring in the industry at present are forcing independent garages out of business. Because of the increasing proliferation of makes and models of vehicles, and the increasing complexity of each vehicle, it is becoming much more difficult for individuals to continue to be knowledgeable about all vehicles. Many generalist garages are becoming somewhat specialized, either in types of cars or in aspects of the technologies, just to stay in business.

The reduced support from petroleum companies, and the need for expensive retraining, have also been cited as reasons for independent garage owners closing their doors. In addition, the longer warranties offered by manufacturers are keeping more of the service and repair business with the dealerships, and less is coming to the independents. There is not yet any statistical evidence available, however, to support the perception that the independent garage sector is declining, aside from the dramatic reduction in the number of gasoline service stations. The following table represents the best available data on independent garages.

Exhibit 3.10

Independent Automotive Outlets in Canada, 1983-1986

	1983	1984	1985	1986
Numbers of Outlets	20,536	18,087	18,074	n.a.
Numbers of Employees	54,294	63,773	63,567	61,344

Source: Statistics Canada

There are four or five times as many independent outlets as there are dealerships in Canada. There has been some drop in the number of independent outlets, but the statistics are insufficiently detailed to state how strong this trend is, or whether it is a short-term change.

The total number of employees increased by 20% from 1983 to 1984; since 1984, there has been very little change in the number of employees. This implies that outlets are employing more technicians, and that the average number of technicians per garage is increasing. Of this group, it is estimated that over 80% (51,000) are technicians , while the rest are administrative and non-skilled labour.

3.6 BODY SHOPS

Industry members estimate that there are about 5,000 body shops in Canada, employing about 30,000 licenced body repairers. These are independent shops; some dealerships also do body work, but this is a small proportion of the body work done in Canada. Statistics Canada includes body shops in their data on independent garages; it is not possible to disaggregate this data to present the trend for body shops alone.

Insurance companies report that there has been a decline in the number of shops in recent years, due to strong competition between shops. Much of this competition has focussed on investment in new technology; those companies which have been able to make the investment have stayed in business, while those which have not been able to afford it, may have had to shut down. New cars, particularly those with unibodies, have required new equipment in order to be repaired; old methods and equipment cannot do the work properly. Some dealers were quick to make this investment, and increased their share of the market at the expense of those shops which delayed buying new equipment.

Body repair shops rely for a large part of their business on the insurance companies. Consumers make claims to their insurance companies once they have had an accident; the insurance companies in turn assess the value of the repair, tells the consumer how much they will pay for the claim, and recommends a shop if requested. All this takes place before the body shop is involved. The consumer comes to the body shop with a fixed amount set for the job, and it is up to the shop to decide whether to accept that price or not.

Insurance companies vary significantly in their handling of body shops. Most have a list of body shops they have evaluated as doing good work at a reasonable price. This evaluation is based on a review of the facilities and equipment of the shop, and any history of work done in the past. The repair work on a vehicle is evaluated by an appraiser - either employed by the insurance company, an independent, or at one of the appraisal centres run by the Insurance Bureau of Canada. Appraisers are generally qualified body repairers; insurance companies try to encourage their appraisers to keep up to date, by taking Inter-Industry Conference on Auto-Collision Repair (ICAR) courses regularly.

The appraisal specifies the amount of time required to complete a job, based on vehicle manufacturers' specifications, and the costs of parts and supplies used. The body shop will input its hourly rate to give the total cost. If the body shop disagrees with the time specified for a job, it may ask the appraiser to make another quote, or get another appraisal, or decline to do the job. Insurance companies take into account varying hourly rates at each shop, based on differing levels of investment in equipment or other overheads; some shops, however, believe that insurance companies do not adjust their figures to allow for the high investment required to stay in business; an average shop has had to invest about $250,000 in new equipment since 1980. However, if a shop is consistently high in its pricing, an insurance company may refuse to pay those rates. A few insurance companies specify an upward limit on the hourly rate they will pay. It is then up to the consumer to decide whether to pay the difference.

This relationship with insurance companies requires that body shops must work to please the insurance companies at least as much as the consumer. Some insurance companies have found their margins being squeezed in the last five years, and have been concerned to keep their costs as low as possible. This has meant in some cases that consumers wanting body repair work have been encouraged to go to the shop which has the lowest price. With this constraint on body shop business, some shops have found it difficult to make investments in new equipment, or in the training of their employees.

There is a substantial difference between the large body shops and the small ones. Large shops have the volume of business which allows them to invest in new high technology equipment, and retrain their bodymen to handle the new technologies, such as unibodies. The small shops do not have the business to support such an investment, and are unable to handle work on some late model vehicles as a result.

Insurance companies report that the cost of body repair work did not increase substantially during the early 1980's, as the shops competed to keep business. Since 1985, however, prices have been increasing as much as 10% a year. Hourly rates may now be as high as $38 per hour; they are still lower than the rates for general automotive shops, and insurance companies concede that they may be lower than costs warrant. Labour costs have accounted for some of this increase; materials - particularly paint - have also become much more expensive, but body shop owners do not believe that the labour costs have increased as fast as the parts prices. The Insurance Bureau of Canada reports that the cost of some aftermarket parts has actually declined in the last few years, although some shops believe that aftermarket parts are inferior to those made for the manufacturers. In the last 6 months of 1987, some shops reported that manufacturers had dropped the prices on some parts, but raised the prices on other.

3.7 SPECIALTY CHAINS

The growth in the number of specialty chain outlets for the automotive industry was a significant phenomenon of the 1960's and 1970's. It is now possible to get mufflers, windshields, lube jobs, brakes, tires or transmissions attended to at an outlet devoted to that one task. These outlets are often franchise operations, appealing to entrepreneurs throughout the country. They compete with other garages by advertising faster service, lower prices, guarantees, or a combination of all three.

Published Statistics Canada data is not sufficiently disaggregated to cover this sector specifically. The 1987 Franchise Annual lists 38 companies running specialty automotive services, with a total of 2,056 outlets, an average of 54 outlets per company. The chains are now competing with each other for business, rather than simply taking business away from traditional garages. These outlets are becoming less specialized, offering more services to the same customers.

Every major chain specializing in automotive service was contacted during the course of this project. From discussions both with head office personnel and outlet managers, it was clear that their need for licenced technicians was minimal. These organizations generally hire untrained labour and take responsibility for their education on the job. It is estimated that there are only 2,000 licenced technicians working in these specialty outlets, an average of one per outlet. Some outlets hire a licenced technician to supervise, but many believe this to be unnecessary.

With the diversification of some of these operations into more services, it may be that there will more demand for licenced technicians in the future. If the operations more closely resemble other garages, they may be required to employ more licenced technicians.

Because the present focus of these operations is on untrained labour, most of the specialist chains felt there was little they could contribute to this study.

3.8 SUMMARY AND IMPLICATIONS

The automotive service and repair industry is highly fragmented, due to the wide variety of products and services, and to the distribution of the Canadian population across a large area. The recent growth in the number of manufacturers has increased competition in the industry, some of which has been evidenced in the appearance of a great variety of new technological features. Technologies have also been developed in response to demand for fuel economies and emission controls. All of these have made the automobile a very different product from that of 10 years ago.

Manufacturers and dealers have reported that the costs of keeping a vehicle serviced are falling. The trend is in the reduced incidence of repair; at the same time, the cost of each repair has increased, but the net effect has still been that the total annual repair cost for vehicles is less. The increasing period for new car warranties is allowing dealers to retain a growing proportion of the total service business.

The growth in cars sales has moved the market towards a very high level of penetration; this market is maturing, and there is unlikely to be much growth in the market in the future, to support the sales of new brands. As a result, competition is expected to remain high, keeping car prices low, and the demand for service under warranty very high.

The service of many of the leading edge technologies requires a sufficiently high level of demand to warrant the investment in specialist skills and equipment to support the vehicles. Service outlets in less populated areas will not find it economic to make this investment, limiting the choice of vehicles to consumers in their area.

The increase in the number of manufacturers in the market has stimulated the demand for dealers and technicians, as they build up support networks. The demand is not expected to continue to be this strong in the future. The retail services sector overall has been shrinking slightly, because of the withdrawal of the petroleum companies from the repairing and servicing of vehicles. This places an increased burden on the retail outlets which remain to meet the demand of the consumers no longer served by gas stations. Manufacturers and dealers believe that the increasingly long warranties will encourage customers to stay with dealers for more of the life of the vehicle, reducing the amount of work for the independent garages to do.

At the same time, the wholesale sector has been growing, and has been expanding its service operation to provide some retail service to their customers, generally in specialist areas such as agricultural vehicles. Wholesalers may find that service becomes a more important part of their business. The growing number of technicians in this trade have been increasing the average number of employees per outlet, rather than going to new outlets.

Specialty chains have been providing competition for retailers, attracting customers with low prices, fast service or guarantees. The loss of this business, considered by some retailers to be "bread and butter", has made continued operation more difficult, particularly for the independent operators.

While there are more than four times as many independent outlets in Canada as there are dealerships, the dealerships appear to have a more assured position in the industry, due to their direct relationship with the manufacturers. The majority of independent garages are generalists, providing any service a customer requires. The proliferation of new makes and models of vehicles, and the new technological developments now make it difficult for generalists to keep up the knowledge they require to stay in business. Many generalists are having to turn away or subcontract business, and become *de facto* specialists in the vehicles they can know well.

4.0 TECHNICIANS

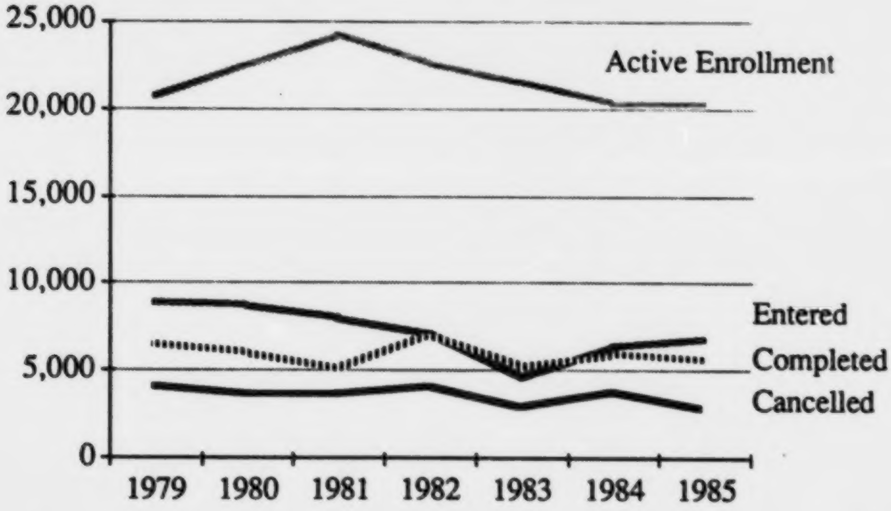
This chapter presents information and analysis on the numbers of motor vehicle technicians in Canada. The first section deals with enrollment in the apprentice programs across the country, and looks for trends and changes throughout the 1980's. The second section provides a similar analysis for licenced technicians. There follows a discussion of the supply and demand for technicians, identifying historic trends, and forecasting future supply and demand.

4.1 APPRENTICES

The graph below (Exhibit 4.1) presents data on the changes in the attendance in provincial apprentice programs between 1979 and 1985. The data for this graph, along with the provincial breakdowns, can be found in Appendix 3. It appears that there has been slight downward trend over this period; some of this may be a reaction to the 1981-82 recession which had an affect on attendance in the early 1980's.

Exhibit 4.1

MOTOR VEHICLE APPRENTICESHIP PROGRAMS



Source: Statistics collected for C.O.P.S. by provincial apprenticeship training authorities

There was a significant decline in the number of people entering automotive apprenticeship programs between 1979 and 1983 across the country. In 1984 and 1985, this trend has been reversed, and new enrollments are climbing again, but they are still down from the level attained in the late 1970's. This decline in entries means that there are fewer people to choose from, which implies that the overall quality of apprentice may be lower as a result. Total active enrollments, perhaps a more significant measure of the supply of future technicians, are also down, and show a more marked trend since 1981.

The number of apprentices completing their training each year has fluctuated considerably. The breakdown between body repairers and motor vehicle mechanics is given in Appendix 3; the number of body repairers completing their apprenticeship ranges from 474 (in 1981) to 833 (in 1982), while the number of mechanics completing the program ranges from 4,438 (in 1986) to 6,142 in 1982. There is no clear upward or downward trend or cycle to this data to indicate what one might expect for the future.

The individual provinces have followed the same trend to varying degrees. Ontario, accounting for over 40% of automotive apprentices in the country, follows the national trend exactly. However, the provinces with less than 500 apprentices each year have experienced a much more gradual trend, with less variation between highs and lows.

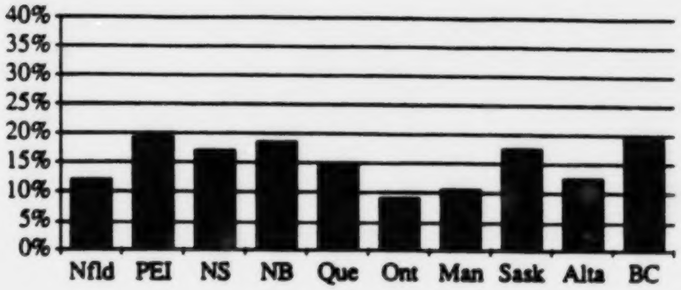
It is interesting to compare the number of enrollments against the number of completions for each province. Exhibit 4.2 opposite gives the relative cancellation rates for each province: that is, the number of people who cancel their apprenticeship expressed as a percentage of the total active in each year; this has been averaged over the years 1979 to 1986. As a benchmark, the averages for all Canada are 17.7% for body repairers and 15.9% for mechanics; these high rates suggest that many people become disenchanted with the trade during apprenticeship, and move to other occupations. The percentage of the auto mechanics apprentices who drop out is higher in the maritimes than it is in central or western Canada, although Saskatchewan and British Columbia both showed high rates as well. The highest rates for body shop apprentices were also recorded in the maritimes and B.C.

In discussions with members of this industry across the country, there were many comments about apprenticeship. Those relating to the apprentices themselves can be summarized under three headings: image, general education and cost. Other comments, concerning the program and the trainers, are presented later in this chapter under the heading of Training Programs.

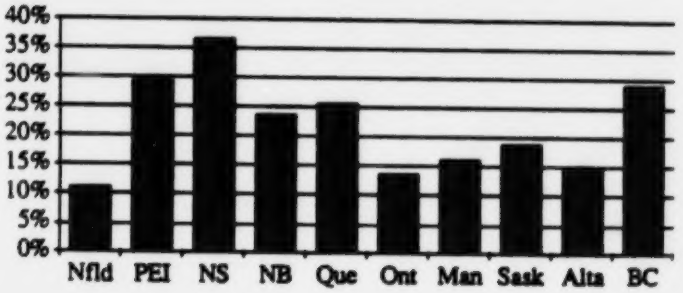
Exhibit 4.2

PROVINCIAL APPRENTICE PROGRAMS

Ratio of Cancellations to Total Enrollment - Auto Mechanics - (1979-1986)



Ratio of Cancellations to Total Enrollment - Body Repairers - (1979-1986)



Source: Statistics collected for C.O.P.S. by provincial apprenticeship training authorities

4.1.1 Image

There is a concern that the traditional image of the trade - that of a "grease monkey" - is deterring better students from entering the apprentice program. Many people believe that those students who have a choice of trades generally choose another one, while those who have no choice are relegated to the automotive trades. This is a gross generalization - many very capable automotive apprentices and technicians discussed these issues in an erudite way during the course of this study - but there may be sufficient truth to this to warrant attention.

The negative aspects to the trade's image which were most often cited were the perception of unpleasant working conditions, the relatively poor wages, the low skill level required and the high cost of entry (tool costs). Many of the people who quoted these comments, prefaced their remarks by saying that these attitudes were clearly untrue, but people persist in believing them. There are already a number of modern shops, complete with modern equipment and clean working conditions, which go against the stereotype. Those are the ones the industry needs to use as examples in a publicity campaign to change the image. Not only would such a campaign address the students' perception of the trade, it would also help the trade see itself in a better light, and perhaps change the conditions in those shops which still reinforce the stereotype.

Apprentices were concerned about their method of payment while attending the classroom training. Apprentices have reported financial difficulties arising from the system of using Unemployment Insurance for support; it takes several weeks for the apprentice to receive the first payment, yet at this low level of pay, there is little opportunity for the apprentice to save enough to carry on through a period of no income. Some apprentices also find the process degrading, feeling that there is a stigma attached to applying for Unemployment Insurance. Both these concerns affect the image which the trade has for young people considering a career.

Apprentices themselves agree that this is not a "high status" trade; many of those spoken to during this study had already made plans to get out of the trade. They explained that they are learning the trade because they like the work, and because the qualification is a guarantee of a job if they are ever down on their luck. However, few thought there was a long term future in this trade, or had plans to stay long after they got their licences.

4.1.2 General Education

There were many concerns about the ability of today's apprentices. There was a concensus that technological developments in the automotive industry made reading and mathematical skills more important than they had been in the past. It is now imperative that the technicians be able to read technical manuals easily, and to comprehend the details of structure, electrical current, pressure and stress. All these make demands on apprentices which students streamed into non-academic education, and leaving school after Grade 9, may not be able to meet.

Many people argue that Grade 12 education must be a prerequisite for the automotive trades; the more cynical people went further, saying that even a Grade 12 graduation certificate was no guarantee that the candidate could read, and that there should be a proficiency test for all candidates in order to qualify for apprenticeship.

4.1.3 Cost

Many employers are concerned about the cost of taking on apprentices. Not only are there the direct costs of salary and training time, but there are the indirect costs of materials, scrap, and hiring costs. In addition, there is the high probability that the apprentice will leave the shop during or shortly after the training.

The Ontario Ministry of Skills Development published a study in June, 1987, detailing the cost of an apprentice. Exhibit 4.3 below comes from that report.

Exhibit 4.3
Costs of Training a Motor Vehicle Mechanic, by Program Year

	Program Year				
($)	1	2	3	4	5
Apprentice Wage	14,506	10,932	17,029	24,223	22,826
Instruction & Supervision Wage	2,740	1,793	2,656	4,188	2,285
Production Loss - through Instruction	4,071	3,362	1,644	1,472	974
Extra Scrap	656	360	563	72	172
Extra Equipment	195	50	552	146	241
First Time Hire Cost	64	-	-	-	-
Extra Hire Cost	10	-	15	4	33
Replacing in-school time	-	1,306	484	374	548
Administration	470	721	598	404	178
Total	22,711	18,525	23,540	30,882	27,250

Source: Abt Associates Survey for Ontario Ministry of Skills Development

This survey quantified the costs to the employer as ranging from $18,525 to $30,882 per year, about two thirds of which is the apprentice's wage. The table does not list the returns the employer might expect from employing an apprentice; some employers have argued that it is difficult to recover much during the first two years of training, as the apprentice is not capable of much productive work during that time. Some further argue that, since it is likely that the apprentice will change employers during or shortly after the training period, there is little incentive to take on an apprentice. There are indeed returns, however, which will offset some of these costs. Few employers have voiced a concern about the cost of not hiring apprentices.

There are also direct costs to government for the apprentice program - paying for seats at community colleges and the Unemployment Insurance allowance - but these costs have not been listed by this survey. The survey does itemize the costs to the apprentice as follows:

Direct Costs	$1,489
Opportunity Costs	18,256
Gross Cost	20,155
less Pay	18,037
less Income supplement	466
Net Cost	$1,652

The direct costs include travel, tools, and expenses while in classes. The opportunity cost is the salary forgone by entering the apprentice program. Apprentices interviewed during this study all talked about the high costs of participating in this program, particularly the direct expense for tools, for which there is no income tax deduction. This was thought to discourage many young people from entering this trade.

4.2 TECHNICIANS

In 1986 there were 158,000 automotive technicians in Canada, with approximately 63% of these in Ontario and Quebec. The following table shows an estimated distribution of auto mechanics across all industries.

Exhibit 4.4

Estimated Number of Auto Mechanics and Body Repair Specialists, by Industry, 1986

Industry	Number	%
Primary Industries	1,720	1.1
Motor Vehicle & Parts Mfr.	5,908	3.7
Other Manufacture	4,609	2.9
Transportation, Storage	11,972	7.6
Construction, Utilities, Communications	3,049	1.9
Wholesale, Retail Trade	122,295	77.2
Other Services	4,399	2.8
Government	4,393	2.8
Total	158,345	100.0

Source: Employment and Immigration Canada, C.O.P.S. Databank

While the vast majority of technicians are in the automotive service sector (here classified under wholesale and retail trade), almost one quarter of technicians are working in other industries. A recent study by the Ontario Ministry of Skills Development suggests that these figures may overstate the number of people employed in the trade. The study found that of those employed in the workforce, only 43.7% were working as technicians; the rest were not actively practicing their trade.

Exhibit 4.5 below profiles the growth of this sector since 1981. The estimated total number of technicians has grown at an average annual rate of 1.9% since 1981. A slight drop was recorded in the total number of technicians in 1982, at the same time as a decline in the number of service outlets was noted, but the employment for this occupation has been steady throughout the 1980's. In the numbers below, total employment by industry is from the Labour Force Survey, with the employment of auto mechanics and body repair specialists being derived from actual industry breakdowns in 1981.

Exhibit 4.5

Estimated Number of
Auto Mechanics and Body Repair Specialists
By Industry in Canada

Canada	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**
Primary Industries	2,016	1,660	1,729	1,802	1,737	1,720
Motor Vehicle & Parts Mfrs	4,343	3,807	4,070	5,436	5,542	5,908
Other Manufacturers	5,127	4,567	4,313	4,359	4,474	4,609
Transportation, Storage	10,932	10,872	10,720	10,289	10,641	11,972
Construction, Utilities and Communications	3,110	2,944	2,889	2,879	2,843	3,049
Wholesale, Retail Trade	111,358	109,542	110,121	115,176	119,226	122,295
Other Services	3,648	3,752	3,769	3,958	4,259	4,399
Government	4,153	4,163	4,233	4,346	4,423	4,393
Total	144,687	141,307	141,844	148,245	153,145	158,345

Source: Employment and Immigration Canada, C.O.P.S. Databank

(Note: Estimated totals are based on self-reporting census data which does not differentiate between licenced mechanics and those who are unlicenced but call themselves mechanics).

An estimated distribution of technicians by province is given in the table which follows.

Exhibit 4.6

Estimated Number of Auto Mechanics and Body Repairers, by Province, 1986

Province	Number	Percent
Newfoundland	2,530	1.6
Prince Edward Island	996	0.6
Nova Scotia	5,236	3.3
New Brunswick	4,766	3.0
Quebec	42,999	27.2
Ontario	57,395	36.2
Manitoba	6,066	3.8
Saskatchewan	5,821	3.7
Alberta	16,136	10.2
British Columbia	16,404	10.4
Total	158,349	100.0

Source: Employment and Immigration Canada, C.O.P.S. Databank

There are significant differences in the problems faced by technicians, depending on whether they work in an urban or rural environment. The types of vehicles in use, the demands of the customers, the concentration of competitive garages and the variety of makes and models are all a function of the size of the community, and the density of the population. The most extreme example is Toronto, a municipality with a large population of garages, a great variety of vehicles, and a high demand for technicians. This environment is significantly different from that experienced in less populated areas; the number of technicians in Toronto is likely to be at least as high as 25,000, based on the high density of the population, the large number of vehicles and the large number of service outlets. This estimated size would make this population of technicians larger than all those found in the Maritime provinces combined. The interests of the Toronto population and the market they serve are different simply because of this density of demand and activity.

The high concentration of technicians in Ontario and Quebec lends substantial weight to the interests and attitudes of members of the industry in those two provinces. Many of the initiatives taken by members of this industry - particularly the manufacturers - are in response to the demands of these two large populations. However, many of the problems discussed in this report, in terms of demand for skilled labour, well-equipped training institutions and full service outlets, are felt most acutely in other provinces where there is a less dense population of technicians.

Body repairers are encountering similar problems to the motor vehicle mechanics. While the traditional approach to body repair involved discrete parts - such as fenders or door panels - the current approach demands that body repairers know about how to fix frames and running gear as well. New unibody construction requires body repairers to take into account changes to the entire structure of the vehicle, although they may be fixing only one part of it. These changes, fundamental to the body repairer's job, have already taken place. Insurance companies have noted, however, that some body shops are not yet equipped or trained to service these new vehicles.

Partspeople and counterpeople were also included in this study. The problems they see as a result of the changes in technology are not as acute as for other technicians - not because the change is not as great, but because they are already used to updating their knowledge on a regular basis. The fundamental skill of partspeople is the identification and cataloguing of parts and components. Each year, a new set of parts appears with each new model of vehicle, and parts people are trained to keep up with this change.

Partspeople are often asked by mechanics to help diagnose a problem. In such a case, they have some difficulty with new technologies, as the applications of the parts they are dealing with are changing. Their confusion is also compounded by the lack of knowledge on the part of the mechanic. This will change, however, as the partspeople become more familiar with the new technologies, and as mechanics know more and make less demands on the counterpeople.

The results of a survey of registered technicians at Ford dealerships in Canada in 1986 gave some insight into the 'average technician'. The average annual income was just under $25,000 for technicians who had been about 13 years in the trade (generally half of which had been spent at the present dealership); this is not a very high wage, compared to other tradesmen, particularly for people with considerable experience. The average value of tools was $9,274; these technicians spend approximately $1000.00 each year on tools, replacing old ones and buying new ones, without the benefit of claiming this expense for income tax purposes. In addition, insurance for tools is not provided by employers, and is prohibitively expensive for individuals, helping to keep the annual expenditure on tools at this high level. The net financial rewards of this trade are thus unlikely to make it attractive to new entrants, compared with other occupations.

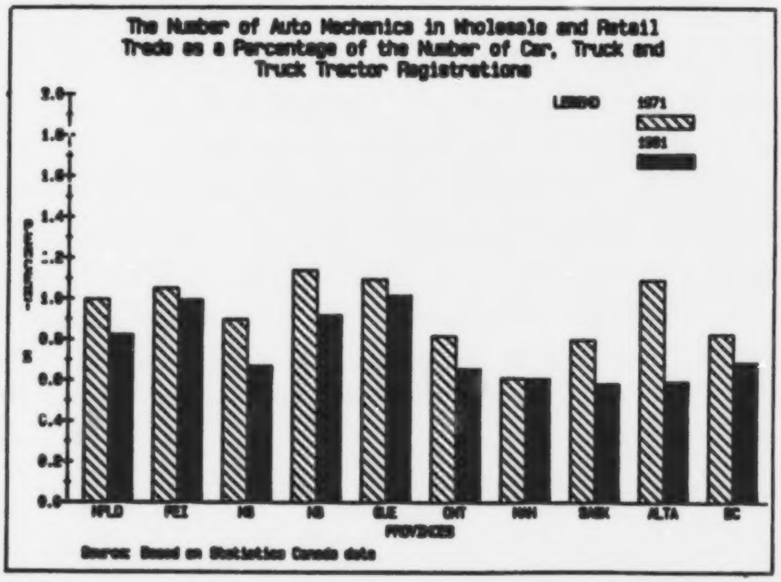
The technicians in the Ford survey also stated that they use shop manuals at least once a day, and had attended training courses within the last two years. These comments suggest that, for technicians in dealerships at least, upgrading their skills is already a regular part of their trade.

The technicians interviewed during the course of this study are aware of the changes which are going on in the industry today, and are concerned about their futures. Part of their concern reflects a certain feeling of helplessness, that these changes are being engineered by forces beyond their control, and that their traditional expertise - a source of professional pride - is being devalued through no fault of their own. The most positive response is to try and change with the times, but the process cannot help but be disconcerting and demotivating to many established technicians. In this environment, many more may leave this trade for a more stable environment.

4.3 SUPPLY

An overall trend that can be identified from Statistics Canada data is that the number of auto mechanics in the wholesale and retail trade industries, as a proportion of the number of motor vehicles registered, declined sharply from 1971 to 1981. In other words, the increase in the number of vehicles on the road over the ten year period was not matched by a similar growth in the number of technicians to serve them. Exhibit 4.7 shows this decline for each province. The result is that each technician has to service more cars. Dealers have noted that the amount of service required for each vehicle is declining, so there may be less demand for technicians per vehicle than there was 10 years earlier.

Exhibit 4.7



The Number of Auto Mechanics in Wholesale and Retail Trade as a Percentage of the Number of Car, Truck and Truck Tractor Registrations

Source: Based on Statistics Canada data

The following table (Exhibit 4.8) presents data on the unemployment picture in this industry in the years since 1981, and the numbers of immigrants with qualifications in this trade who have come to Canada.

Exhibit 4.8

Automotive Mechanics and Body Repairers - Unemployment and Immigration

	1981	1982	1983	1984	1985	1986
Employed Technicians	144,687	141,305	141,844	148,245	153,145	158,350
UIC Beneficiaries						
Motor Vehicle Mechanics	4158	8154	8014	6111	5319	4706
Body Repairers	1571	3160	3408	2838	2429	2373
Total	**5729**	**11314**	**11422**	**8949**	**7748**	**7079**
Landed Immigrants						
Motor Vehicle Mechanics	613	616	297	264	344	437
Body Repairers	138	108	48	36	66	97
Total	**751**	**724**	**345**	**400**	**410**	**534**

Source: Employment and Immigration Canada, C.O.P.S. Databank

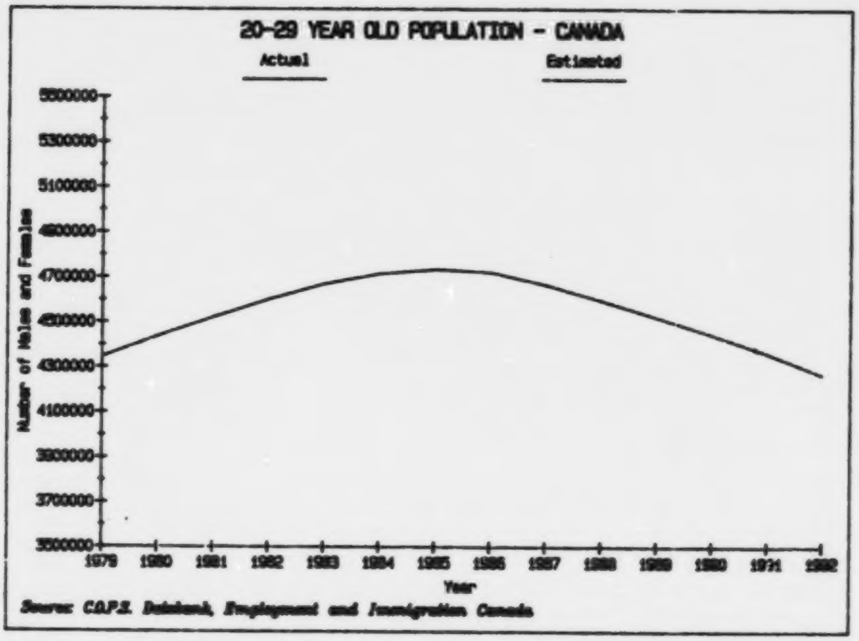
The unemployed rate for this industry went from 4% in 1981 to 8% in 1982; it has been declining since then, and reached 4.5% in 1986. The decline has been much stronger for mechanics than for body repairers; the number of body repairers unemployed in 1986 was still 50% higher than it was in 1981.

The table also shows the change in the number of immigrants to Canada who have qualifications in this trade. The total has been declining since 1981, although there was a substantial increase in 1986. If demand for technicians is increasing, as suggested by the decline in unemployment in this trade, it would be logical to see some increase in the immigration to meet this rising demand, once unemployment had reached its base level.

It has been established in the first section of this chapter that the number of apprentice completions fluctuated around 6000 per annum from 1979 to 1985. If 6000 apprentices continue to complete their training each year until 1991, the pool of technicians would be approximately 182,000 in 1991 (based on the 1986 population of 158,000). This figure, however, does not take into account those who leave the trade each year, because of retirement, death or adoption of another trade. The issue of migration of auto tradespersons to other industries has been raised by many participants of this study, and requires serious attention. CEIC is undertaking research into this issue, in order to determine the nature and extent of the migration problem.

There is a demographic factor which must also be included in the calculation of future supply of technicians. Approximately 80-85% of apprentices registered in programs are between the ages of 20 and 29. This portion of the population is gradually declining in size, as shown in Exhibit 4.9 below. Therefore, in order to ensure stable apprenticeship completions in the future, a greater proportion of the 20-29 age group must be persuaded to register in the program than have in the past. For example, in 1979, 6000 apprenticeship completions represented 0.138% of all 20-29 year olds; in 1985, the same number of completions represented 0.127% of this age group. But by 1992, 6000 completions would represent 0.141% of all 20-29 year olds.

Exhibit 4.9



Source: C.O.P.S. Databank, Employment and Immigration Canada

The implication of this demographic factor is that the automotive apprenticeship program must attempt to attract a larger proportion of young people. This will require a change in image, and a concerted effort to make the trade attractive to new entrants. It may also be appropriate to try to attract more women to this trade.

If only 0.127% of 20-29 year olds complete automotive apprenticeships, as was the case in 1985, then the supply forecast for technicians would be altered somewhat. By 1991, there would be 180,000 technicians in the trade, as opposed to the previous forecast of 182,000. As mentioned earlier, neither of these figures takes into account those leaving the trade each year.

CEIC's Labour Adjustment Study of the automotive manufacturing sector found that between 2.5 and 3.0% of the people employed in that industry left the labour force each year. If it is assumed that a similar proportion left the automotive service industry, the number of technicians available in 1991 would be about 162,000.

4.4 DEMAND

An indicator of demand for automotive technicians is provided by the Provincial Skills Shortages Designations. The CEIC regional offices in each province conduct labour market analyses to identify occupations in which demand exceeds supply. Once an occupation is designated, it becomes eligible for funding for retraining under the Canadian Jobs Strategy. Over 250 occupations are now catalogued by Employment and Immigration Canada as having designated shortages in at least one province. Exhibit 4.10 summarizes that data for the automotive service and repair occupations.

Exhibit 4.10

Skill Shortages Designations, by Province, October 1987

	Motor Vehicle Mechanic	Industrial Truck Mechanic	Motor Vehicle Body Repairer
Newfoundland			
P.E.I.	*		
Nova Scotia	*		
New Brunswick			
Quebec			
Ontario	*		*
Manitoba			
Saskatchewan	*		*
Alberta			
British Columbia	*	*	*
Yukon	*		
N.W.T.	*		*

Source: Employment and Immigration Canada

The fact that the province with by far the largest population of mechanics and body repairers - Ontario - has demonstrated a serious shortage of people in these trades, suggests that the scale of this problem is significant. Of the 254 trades listed as having a designation in at least one province, only one other (Electronic Equipment Repairer) has more designations than Motor

Vehicle Mechanic. Thus it is clear that the scale of the technician shortage problem in Canada is significantly high.

The relationship between the number of vehicles registered and the number of technicians serving them was described in Exhibit 4.7, in the previous section of this chapter. If the change in that relationship over time is profiled, and some projections about the future change are made, forecasts of the future demand for technicians can be developed.

To calculate the number of vehicle registrations in 1991, a ratio of vehicle registrations to populations can be used. Exhibit 4.11 which follows shows the historic relationship, and population forecasts to 1992.

Exhibit 4.11

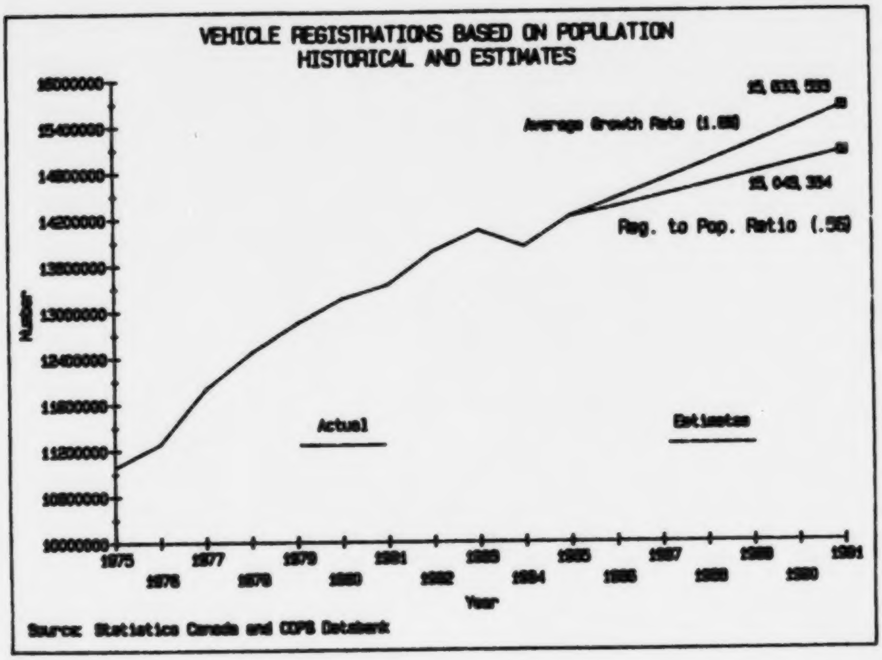
Vehicle Registrations and Population in Canada

Year	Car, Truck and Truck Tractor Registrations (1)	Population(2)	Registrations to Population	Growth Rate
1975	10,982,200	22,697,100	.48	-
1976	11,282,700	22,992,600	.49	2.08
1977	11,996,600	23,272,700	.52	6.12
1978	12,462,800	23,517,100	.53	1.92
1979	12,839,300	23,747,200	.54	1.88
1980	13,158,200	24,042,500	.55	1.85
1981	13,337,400	24,341,700	.55	0.0
1982	13,769,700	24,631,800	.56	1.81
1983	14,039,200	24,884,500	.56	0.0
1984	13,827,600	25,123,800	.55	(1.78)
1985	14,213,300	25,358,545	.56	1.81
1986		25,598,189		
1987		25,850,655		
1988		26,106,699		
1989		26,364,094		
1990		26,616,472		
1991		26,863,097		
1992		27,102,522		

Sources: (1) Statistics Canada
(2) C.O.P.S. Databank

From this table, it can be seen that the ratio of vehicle registrations to population has stayed at roughly .56 since 1979. If it is assumed that this remains constant to 1991, the number of vehicle registrations is likely to be approximately 15 millions in that year. If the ratio of registrations to population climbs, as it did between 1975 and 1985, at an annual rate of 1.6%, then 15.6 million vehicle registrations are forecast for 1991. Exhibit 4.12 below graphs this relationship.

Exhibit 4.12



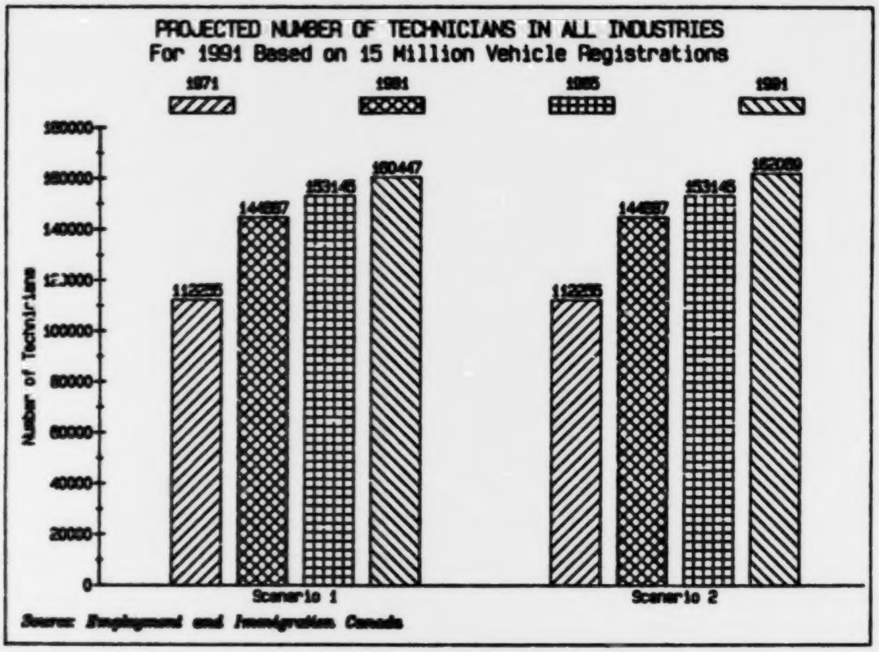
Source: Statistics Canada and COPS Databank

Using these forecasts for future motor vehicle registrations, further estimates can be made for the number of technicians required. From 1971 to 1981, the drop in the ratio of technicians to vehicles registered was 0.0024, from 0.01323 in 1971 to 0.01085 in 1981. From 1981 to 1985, the ratio continued to drop, but not as quickly, to 0.01077 in 1985. Based on the forecast for the number of vehicles registered (ranging from 15 million to 15.6 million), and these trends in the ratio of technicians to vehicles, two scenarios can be developed to forecast the demand for technicians in 1991.

> Scenario 1. The average annual decrease in the ratio of technicians to vehicles continues at the 1981-85 rate of 0.00169 each year to 1991.
>
> Scenario 2. The ratio of technicians to vehicles registered remains at its 1985 level of 0.01085.

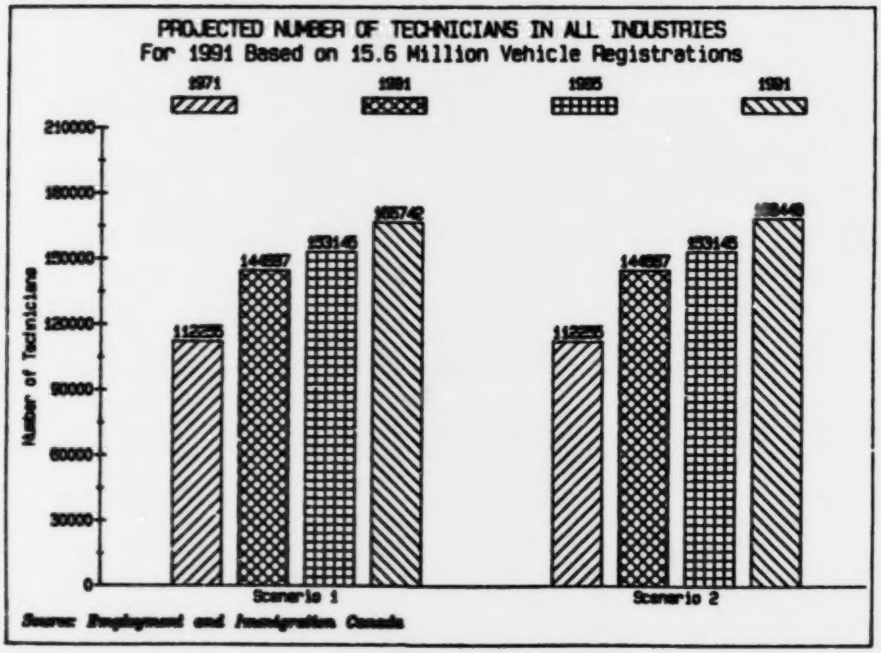
The graphs below forecast the number of technicians required in 1991 for each of these scenarios; Exhibit 4.13 gives forecasts for 15 million vehicle registrations in 1991, while Exhibit 4.14 gives forecasts based on 15.6 million vehicles. The forecasts range from 160,000 to 168,000 technicians needed in 1991.

Exhibit 4.13



Source: Employment and Immigration Canada

Exhibit 4.14



Source: Employment and Immigration Canada

The Canadian Occupational Projection System (COPS) of Employment and Immigration Canada develops forecasts for the demand for auto mechanics and body repairers to 1995. Their forecast for 1991 is 168,000 technicians, clearly on the upper end of the range established above.

Exhibit 4.15

Estimated Demand for Auto Mechanics and Body Repair Specialists, by Industry

	1986		1995		Change
Industry	Number	%	Number	%	%
Primary Industries	1,720	1.1	1,896	1.1	1.1
Motor Vehicle & Parts Mfr.	5,908	3.7	7,607	4.3	2.8
Other Manufacture	4,609	2.9	5,136	2.9	1.2
Transportation, Storage	11,972	7.6	12,715	7.2	0.7
Construction, Utilities	3,049	1.9	3,397	1.9	1.2
Wholesale, Retail Trade	122,295	77.2	135,539	76.8	1.1
Other Services	4,399	2.8	5,390	3.1	2.3
Government	4,393	2.8	4,722	2.7	0.8
Total	158,345	100.0	176,402	100.0	1.2

Source: Employment and Immigration Canada, C.O.P.S. Demand Model

COPS predicts that the demand for qualified technicians will increase on average by 1.2% per annum to 1995, increasing the required number of working technicians from 158,349 in 1986 to 176,402 in 1995. The forecast suggests that there will be slightly stronger growth in demand for technicians from other industries - notably motor vehicle manufacturing and other service sectors - than in the automotive service sector (here listed under the heading of wholesale and retail trade). Overall, this level of growth is comparable to the growth rate the motor vehicle manufacturers predict for the sale of new cars over a similar period.

The supply forecasts from the previous section suggest that, assuming no technicians leave this trade to go to other industries, 162,000 technicians will be in the trade in 1991. Clearly this most optimistic supply forecast will only just cover the most conservative demand forecast.

Most industry experts believe that there is indeed a shortfall between the supply and demand for automotive technicians. During the interviews for this study, people had difficulty differentiating between their need for more technicians, and their need for better qualified technicians. It appears that , although many people described a need for more ordinary technicians, the demand is for better qualified technicians. Our analysis suggests that there is a *supply of technicians* in the workforce, but that the industry is looking for ones who have a higher level of ability. These are more difficult to find, perhaps because there are fewer of them, and because they are being paid higher wages to work in other industries.

4.5 RETAINING TECHNICIANS

A report published by the Ontario Ministry of Skills Development in 1986 described the migration path of technicians out of the automotive service sector. As Ontario represents such a large proportion of the employment in this industry in Canada, the comments in this report may apply to the overall trade. The table below, reproduced from that report, illustrates the employment of certified mechanics by industry.

Exhibit 4.16

Employed Certified Mechanics in Ontario, by Industry, June 1986

Industry	Percent
Automotive Service and Repair	49.9
Manufacturing	11.4
Storage and Transportation	10.1
Government	7.3
Services	4.9
Primary Industries	3.4
Retail	2.3
Communications	2.2
Construction	2.2
Other Industries	3.0
All Industries	100.0

Source: Ontario Ministry of Skills Development

It is remarkable that just over 50% of the qualified mechanics working in the province have found employment outside this industry. It is not due to unemployment; in Ontario, the unemployment rate in this sector is one of the lowest for all industry, at 2.3%. The number of qualified technicians working in the trade was found to be closely related to age, with the older technicians being more likely to be working in another industry.

The problem of migration out of the automotive service sector was raised by a significant number of people interviewed for this study. A number of employers complained about their best technicians being taken from them by the lure of higher wages and better working conditions. Some had little confidence that they could keep good staff at all, thereby undermining their business position.

4.6 SUMMARY AND IMPLICATIONS

The data analysis on automotive apprentices and technicians during the 1980's provides the following information:

- the number of people enrolling in automotive apprentice programs has been falling since 1980
- the demand forecast for automotive technicians predicts that the number of people employed in this industry should rise by an average of 1.2%, or about 1,200 people a year to 1995
- the supply of technicians may be inadequate to meet this demand.

The number of technicians in Canada has not grown as fast as the number of vehicles in use; as a result, each technician has more cars to service. Combined with the reduced need for service on today's vehicles, the net effect may be that there is the same amount of work to be done. Yet, clearly, many provinces in Canada are without the technicians they need to serve the market.

The task facing the industry is how to address this skill shortage. There are two aspects to this: one is to retain the technicians who are already in the trade, and the other is to upgrade the image of the apprenticeship courses so that more new entrants are attracted to the trade.

5.0 IMPLICATIONS OF NEW TECHNOLOGIES

This chapter discusses the changes in the automotive industry appearing as a result of new technologies, and presents the implications for various members of the industry. We start by identifying the area of most immediate concern, and look at the service implications, and the issues which will have to be addressed to implement the changes. The chapter concludes with a brief summary of the important points.

5.1 TECHNOLOGICAL CHANGE

The new technologies which have been appearing in vehicles and in the diagnostic equipment are designed to make cars run better, use less fuel, run more cheaply, and to analyse the problems as soon as possible. The problems which technicians are experiencing are not significantly different from those in any other industries which have been undergoing technological change. The problem is that the technology is new, not only to technicians but also to the manufacturers and the rest of the trade. Because the technology is new, it does not perform in the same way as the old technology did, and there is not the confidence that comes from familiarity. Many of the problems which have been discussed during the course of this work will be solved once the industry has better knowledge of the technology. For instance, in the television repair industry, technicians had great difficulty coping with solid state technology when it first appeared, because their trade had been concerned with the diagnosis and repair problems of tubes. Once the solid state technology had been established for a few years and the technicians had had the opportunity to learn about it, the trade was able to cope much better.

The analysis in this chapter deals with vehicles in general. In our discussions with people in the industry concerned with heavy trucks, many of the same comments were heard, but it was clear that the technological changes had not affected that part of the industry as much. The rate of change for the design of heavy trucks is much slower, so that, although electronics and other new technologies are being introduced, technicians are having more time to adjust to the changes.

CEIC's Occupational and Career Information Branch assembled a list of automotive technologies which will have an effect on the skills demanded of technicians during the 1980's. This list is reproduced in Exhibit 5.1 on the following page. Most of the technologies listed are already present in some vehicles, and are gaining acceptance in the industry.

Exhibit 5.1

Automobile Technologies Impacting on Skills in the 1980's

Electronic Fuel Injection
Logic Modules
MAP Sensor
Throttle Body Assemblies
Fuel Pressure Regulators
Oxygen Sensors
Vehicle Speed Sensors
New types of Solenoids
Knock Sensors
Hall-effect Distributors
Anti-theft Devices
Touch Screens
Engine Electrical Analyzers
Signal Generators
Anit-lock and Anti-skid Brakes
Laser and Radar Systems
Voice Alert Systems
CV Transmissions
Electronically monitored and Adjusted Suspensions

Source: Employment and Immigration Canada, Occupational and Career Information Branch

Information on "leading edge" new technologies is proprietary and was not discussed during the series of interviews with manufacturers, but all manufacturers are planning for a greater proliferation of the technologies which have appeared on the 1988 models. These technologies include:

- electronics (in almost every aspect of the vehicle's operation)
- adaptive braking
- four-wheel steering
- continuously variable transmissions
- unibodies
- new materials: plastics, new steels, ceramics
- electronic control and guidance systems
- automatic leveling
- multiplex wiring

Automobile manufacturers believe that the phase-in period for these technologies will allow technicians well trained in "the basics" to pick up the new skills required to service these vehicles.

The thrust of the technological developments of the future will be the integration of the control of all aspects of the vehicle through the use of electronics. This has started with the introduction of on-board computers, but will extend so that the computer power is centralized in the vehicle, rather than focusing on a specific area. Ford has listed a number of technologies which will be introduced over the next decade:

- Torque-demand powertrain control which fully integrates the response of the engine and the transmission;
- Electronic suspension control for both improved ride and enhanced handling characteristics;
- Electric power management based on new power generating components and sophisticated load management controls;
- Traction control derived from full powertrain control coupled with anti-lock braking;
- Multi-purpose soft switches and shared displays for driver information, climate control and entertainment functions.

Electronics are affecting vehicles in three ways, each having a slightly different impact on the service sector:

1. Computers are controlling much of the operation of the vehicle, resulting in better control of the vehicle, and less need for servicing (due both to the ability of the electronic controls to run the system better and to the improved components in the system).
2. Electronic sensors and controls are becoming integrated into every part of the vehicle, from brakes and steering to suspension and fuel injection. This will demand that specialists develop an awareness of the electronic system for the entire vehicle, in order to avoid problems caused by working on only one part.
3. Computers are storing and reporting information to the driver and to the diagnostician, giving early warnings about problem areas and potentially making diagnosis easier. The result will be earlier and quicker diagnosis and better running vehicles.

Electronic technology in general requires a more sensitive handling from service technicians, as even the lightest touch may cause a short which could damage the entire system. It also demands a specialist knowledge which has not historically been a part of the apprentice training program.

The long term issue which needs to be evaluated is whether the evolution of the technology will demand a higher or lower level of ability than technicians have at present. The answer appears to be that in the immediate future the skill level must be higher, because of the newness of the technology. Technicians all need to have more ability than they do at present in order to cope with the changes, but the long term demand may be different. This issue was discussed with a number of people, particularly the manufacturers.

Manufacturers have not resolved whether their repair strategies call for de-skilling or re-skilling their dealers' technicians. Their views are mixed regarding the required level of expertise technicians will need in the future. On the one hand manufacturers are adopting ever more sophisticated on-board electronics, which they believe will require more capable and competent repair technicians. On the other, they are designing more diagnostic equipment into vehicles, and developing smarter diagnostic equipment for location in the dealers' premises, which they say will reduce the level of skill required of technicians to diagnose problems. The changes in engine design may also lead to the lower skill requirements for engine repair.

While diagnostic tools may in the long term simplify the technician's job, at present the technicians must have expert knowledge to interpret and act on the output from such equipment. Manufacturers see that there are two ways this problem can be approached: one is to assist each dealership to invest in sophisticated and expensive electronic equipment which will handle much of the diagnosis. Another approach is to upgrade technicians to handle the diagnosis themselves. Some manufacturers believe that it is more cost effective to invest in the retraining of the labour force than in the technology. .Increasingly complex vehicles demand a higher level of ability from some service personnel, but the changes in component design may in the future deskill many of the jobs in the service bay. The net affect may require a number of more highly trained technicians to act as foremen, supervising a team of less skilled workers to do routine parts replacement, among other tasks.

5.2 TECHNOLOGY AND VEHICLE SERVICE

There have been two main thrusts in the design of new vehicles over the past 10 years. The first is the trend to 'design for manufacture' adopted by the manufacturers to keep costs down to remain competitive in a market shifting to smaller inexpensive cars. The second thrust has been ecological, focussing on the need to improve fuel consumption and engine efficiency, while at the same time reducing emissions.

These two trends have been influencing the industry; they both have created problems for the service sector. 'Design for manufacture' (described in Section 3.2) allows cars to be made more cheaply, but may make them more difficult to service, because of sealed assemblies, or parts which are difficult to access. The vehicle has become a more complex machine as a result, making it more difficult to service with only traditional training.

In addition to the increasing demands being made on the ability of technicians, these developments have made it more difficult for owners to service their cars themselves. While the traditional 'do-it-yourself' approach worked very well with mechanical technology, the addition of electronic technology has made it very difficult for an owner to touch anything without compounding a problem.

Another development has been the design of sophisticated diagnostic tools. Some scopes provide detailed information on a variety of models, while other computerized equipment is designed specifically for one model. This equipment is expensive; garages must be able to use such tools on a frequent basis in order to justify their investment. In some cases, manufacturers require that dealers purchase the appropriate equipment as a prerequisite for the privilege of selling a particular new model. Some dealers in smaller communities may have to forgo the opportunity to handle the model if they do not believe they can sell sufficient numbers of a model in order to justify the investment in the diagnostic equipment. This will limit the models which are available to customers in less populated areas.

5.3 IMPACT OF TECHNOLOGICAL CHANGE ON SKILLS

The developments noted above have enlarged the skill set required of automotive technicians, to include, for example, basic electronics theory, and a higher level of diagnostics. Interviews throughout the industry have suggested that, as a consequence, it has become very difficult for technicians to remain generalists. Technicians inevitably specialize to some extent, and become particularly adept at one aspect of the vehicle, or one kind of vehicle. Those who have prided themselves on their ability to service an entire vehicle - particularly the independent garages - are now finding that there are parts which are no longer familiar to them.

The skill set of technicians is changing dramatically. The mechanic of the past needed a theoretical and 'hands-on' understanding of hydraulics, fuel combustion and mechanical functions (such as the workings of standard transmissions) to do his job successfully. Almost all of a mechanic's work was related to repairing relatively easily diagnosed problems of mechanical components.

It is clear that this is no longer the case. While technicians must still understand the above-mentioned functions, the key is now understanding how electronics overlay and control these functions. Diagnosis is now a much more difficult task. In the past, a certain amount of 'trial and error' diagnosis was acceptable; such an approach on new cars today - which might include replacing on-board computers on a 'trial and error' basis - would be intolerably expensive.

Manufacturers indicated that the skill set of a thoroughly competent technician would include the following:

- understanding hydraulics, fuel combustion and mechanics (the traditional skills of a mechanic);
- excellent manual dexterity to handle very delicate electronic components and connections;
- ability to understand and use precision measuring equipment;
- ability to understand and use computer equipment;
- a solid understanding of electronics, including the ability to read, understand and apply circuitry diagrams;
- the ability to read, understand and follow sophisticated service manuals;
- deductive reasoning skills in order to diagnose and think through problems.

Technological change has brought about a situation within the trade where there are a substantial number of qualified, experienced technicians who are discovering that they can no longer depend on their experience to guide them. These established professionals are brought to a watershed in their careers as a result of the changes in the industry. They must decide whether it is worth their while to retrain themselves, or to get out of this trade and find work elsewhere. Some employers reported to us that older technicians may see a newly qualified technician, having recently completed the apprenticeship program at one of the more advanced colleges, already having more expertise than a veteran with many years of experience. The result is a serious morale problem for the older technicians.

Technicians must also be trained to use diagnostic equipment. This demands an ability to read codes, and to interpret data rather than words. The equipment can be very confusing, and difficult to understand. This skill does not come easily, and requires some time to develop. This is a problem which manufacturers are already observing in their dealerships. Manufacturers receive many components which are sent back as defective, but which, once tested, are shown to be fully functional.

The manufacturers list the major reasons for poor diagnosis as follows:

- technicians not reading service manuals because they rely on past experience - experience which is no longer sufficient to solve current problems;
- technicians not diagnosing problems, but following the directions of the service writer, since that is what the technician is paid for. (This is a negative aspect of the flat rate system, in that the system can discourage a complete exploration of the vehicle's problems);
- on-board computers which are not sophisticated enough. For example, the computer may indicate a component failure, when a connector or wire is at fault;
- technicians simply not understanding enough about electronics.

Vehicles are becoming increasingly self-diagnosing, which might indicate that the skill shortage among technicians could be solved by the technology. Manufacturers believe, however, that such a solution will be a long time coming, if it ever arrives, and that some technicians will have to be more highly skilled in diagnostics to cope with today's problem.

5.4 REACTING TO TECHNOLOGICAL CHANGE

The solution for coping with technological change most frequently given during the course of this study has been to establish retraining programs for practicing technicians. This raises the questions of how much it is possible to teach established technicians with many years of experience about new technologies, what subjects should be taught, and what level of achievement should be demanded of this population. Each one of these issues is dealt with in turn.

5.4.1 Retraining capabilities

There is a serious concern that the current population of qualified and experienced technicians does not have the requisite skills to handle new technologies, and that they are lacking in much of the basic reading,comprehension and mathematical skills needed to benefit from an upgrading course on new technologies. Indeed, any person who has been away from formal education for an extended period may find it very difficult to learn in that environment again.

The issue is not that technicians today are incompetent, but that the skill set required of them has changed since their certification, and that these new skills are quite different from the ones they have been used to. This fundamental difference means that any retraining in the new technologies will be difficult for this population, and some technicians may find it impossible to learn the new skills. The private trainers are already running courses for those who are motivated; yet those who are not motivated, may be the ones who need retraining the most.

5.4.2 Approach to Retraining

There has been considerable discussion about the relative merits of general education and specialist education. Most people agree that an apprentice's education should be general, covering all the basics. Most working technicians become experts in a particular field, such as transmissions, over the course of their careers; thus the technicians to be retrained will be experts in some areas of a vehicle, and have forgotten much of their general training in other areas.

With this in mind, it is not clear whether retraining should cover all the basics again, or whether technicians should be allowed to upgrade their skills in a particular area only. A large number of people were questioned on this issue. Most technicians favour the latter approach, as being the most practical, and the least daunting. However, because the new computers and electronics are connecting all parts of a car together, some technicians believe it may be necessary to know more than simply transmissions, however well that one area is covered.

5.4.3 Standards and Recertification

One of the major problems of retraining which surfaced in discussions, is that individuals have a wide variety of qualifications and experience. Faced with this mixture, it is inevitable that the existing retraining programs are beyond the abilities of some, and do not meet the needs of others.

Employers, however, want more assurance that when individuals are being sent on retraining courses, they will add to their skills and be more proficient in their job when they return. This situation would indicate that screening of attendees before the course, and proficiency testing after the course would be useful.

Manufacturers are particularly concerned with the need for upgrading journeymen technicians, and for assessing their level of ability. In this regard, a number of manufacturers raised the concept of the Automotive Service Excellence (ASE) program in the United States. This program offers a standardized series of tests on various disciplines in the automotive trades, and through efficient marketing has created a perception about the quality of the ASE qualification. The program has nothing to do with training, but only the establishment of objective standards of ability. A pilot program run by the ASE is being considered in British Columbia.

There was no concensus of opinion among manufacturers and importers on the appropriateness of this program for Canada. One supplier considers the program to be very good for specialized areas, but not necessarily as good at covering the basic skills which the colleges address. Another believes that the ASE program is very basic, and would not be appropriate to deal with advanced level courses for journeymen. The advantage of the approach is the nationally recognized level of achievement, consistent throughout the population. The difficulty of applying it would be the establishment of the standards broad enough to include all provinces, but not so low as to be meaningless.

Another approach being used by some manufacturers is the Master Technician program. Technicians in dealerships who attend the requisite courses put on by the manufacturers and pass a qualifying test are awarded titles, such as Technician, Certified Technician and Master Technician. These titles are a public recognition of a superior level of achievement; the award is a plaque, and a mention in the dealer newsletter. This is seen to be an important motivator to the technicians, and partially addresses what many suppliers consider to be insufficient social and peer group respect received by technicians. There is not necessarily a direct correlation between these qualifications and the salary levels. Indeed, one company which has tried to implement such a system has not found it successful, because unionized dealerships would not agree to have future salary increases tied to these training programs.

5.4.4. Implementation of Retraining Programs

In addition to the three core issues discussed above, several other concerns about the implementation of a retraining program were mentioned which require attention.

Some mechanics and their employers are already trying to come to grips with the problem of incentives for retraining courses. No evidence was found of employers offering wage incentives to technicians who take these courses. Without such incentives, there is little reason for the technician to put up with the perceived aggravation that the course entails.

The cost of the retraining course may be a disincentive for some employers and also for the technicians. The costs include not only the fees for the course, but also lost revenues, and perhaps lost business. If the perceived benefit from these courses is not high, it will be difficult to encourage attendance against these costs.

Many people on this study have made the point that there is no incentive for a mechanic to learn new skills when he can make more money under the flat rate system by continuing to do standard work quickly. If there is sufficient standard work to be done, the flat rate system is a disincentive to retrain; new tasks will always take more time to perform than old familiar ones, rewarding those best who stick to traditional tasks. It will be important to look carefully at this payment system and evaluate whether it continues to be effective with the new technology.

All technicians are aware of the changing nature of their business, and some work to keep abreast of new developments. They are generally interested in the automotive trade, and enjoy reading the magazines discussing the latest developments in the industry. In this atmosphere, some retraining is to be expected, and will not provoke a reaction. The difference with the present retraining needs is in the scale of the courses required. The courses will need to be longer, to accommodate unfamiliar technologies, and will be more difficult to comprehend.

There are three different places where technicians look for retraining courses: community colleges, manufacturers, and private entrepreneurs. Of these, the suppliers of vehicles, parts and materials are the most popular, primarily because their courses are usually free. The automotive manufacturers all have training divisions to serve their dealerships. Parts suppliers, diagnostic equipment suppliers, paint distributors and aftermarket suppliers all offer demonstrations, seminars or presentations on their products. These may be organized at the supplier's offices, or through a local trade association.

Community colleges offer advanced training courses for the automotive industry. Provincial Advisory Committees help develop appropriate course outlines, and the colleges schedule them. These courses are the subject of much discussion in the industry. They are criticized for being out of date, inappropriate to their needs, too long, and at inconvenient times. Few of the people met during this research, however, had actually taken these courses; they cited the above reasons for not signing up for the courses at all. It is clear that these courses do not have the reputation to attract technicians (colleges admit that overall these courses are not well subscribed), regardless of whether these criticisms are warranted.

Some colleges are taking initiatives in this area, by working with suppliers or large employers to develop upgrading courses customised to their needs. There are cases where this is proving particularly successful.

A number of private training companies have started independent courses, covering particular technologies, makes of vehicles, or vehicle components. Their courses are offered to the public, or under the auspices of a trade association. They are generally well received, and are run as frequently as demand warrants.

5.5 SUMMARY AND IMPLICATIONS

There are two types of technological development which have been taking place throughout the 1980's. The first is the vehicle design, which focuses primarily on improving the attributes consumers find attractive, and making the production process more efficient and less expensive. "Design for manufacture" allows vehicles to be sold at lower prices, but may make later servicing more expensive. Greater use of subcontracted components may make these parts easier to replace than dismantle and diagnose, again increasing costs. The designs are significantly more complex than they were 10 years ago, demanding greater skills on the part of the service staff to diagnose and repair the vehicles. It also makes it almost impossible for consumers to fix cars themselves.

The second technological development is the amount of diagnostic equipment for vehicles, both on-board and in the shop. These have been designed to make the technicians' lives easier, but the immediate effect has been to make things more difficult, because of the complexity and diversity of designs and interfaces; technicians have to be specially trained in the use of this equipment, and in the interpretation of the readings.

In the future, the industry is likely to require two levels of skilled labour; one very highly skilled group to handle the sophisticated and detailed work, and another much less skilled group to handle routine work. The present trends in technology suggest that the former group is going to be quite small, while the latter group will contain the great majority of members of the trade.

The retraining of journeymen technicians is a short term issue, focused on the immediate need to have a labour force skilled in servicing the existing technologies. There is some concern that older technicians may find it very difficult to learn about electronics and other technologies, which will impede the upgrading of the labour force. This is an untested assumption, and may resolve itself by attrition as the technologies become more standard and the older technicians retire; this would be a long term solution, which does not deny the need for immediate attention to the short term retraining.

Many people in this industry are concerned about the standard of the technicians' abilities, particularly related to the new skills which are required. Some suggest that a recertification process might be appropriate, to establish national standards, and to give a benchmark by which to judge all technicians.

6.0 TRAINING

This chapter profiles the training process for automotive technicians, both apprentices and journeymen. The existing system is described, and discussed according to perceived inadequacies, and needs for alternative approaches.

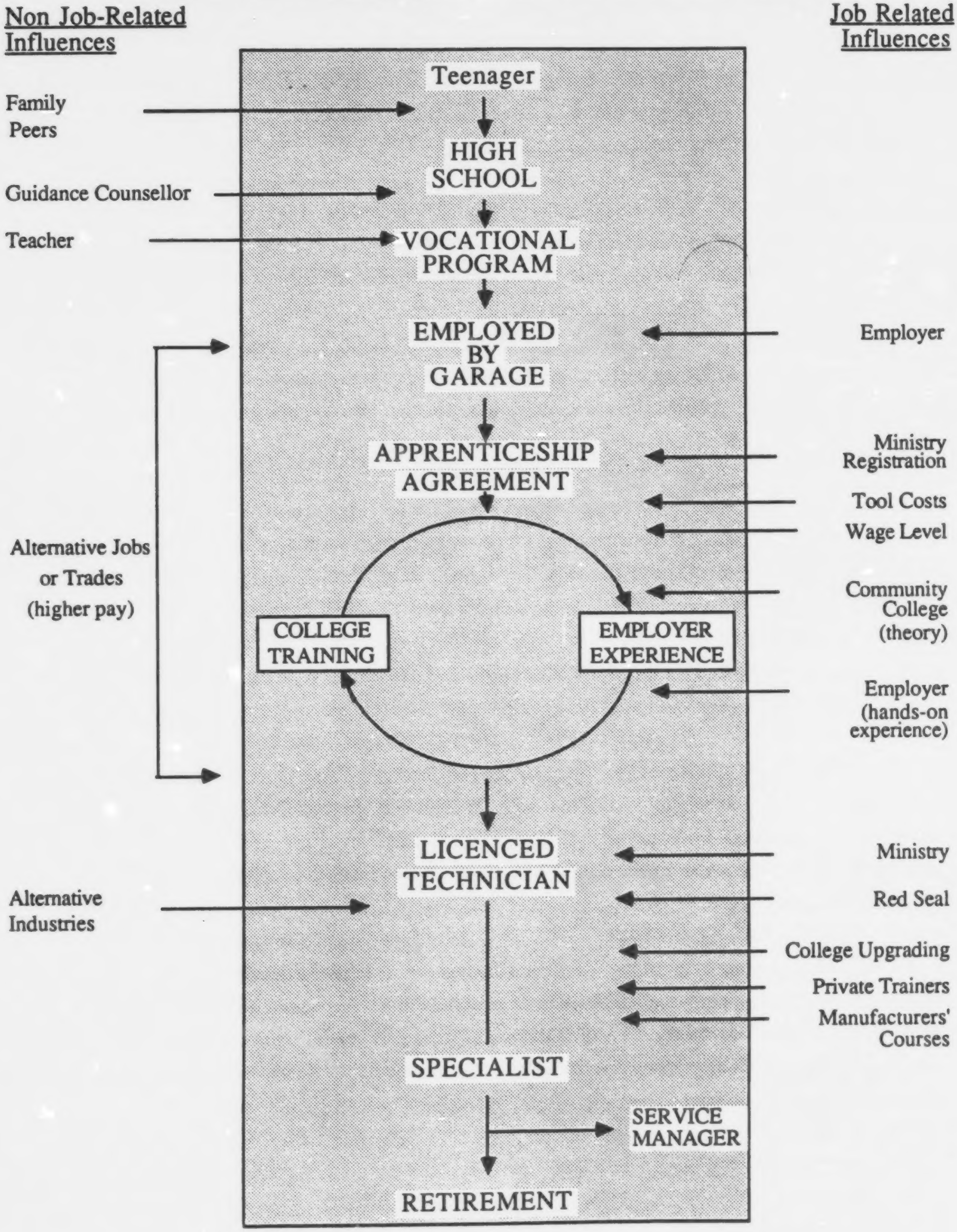
There are three sources of training programs for this trade. The community colleges and institutes of technology are responsible for the classroom portions of the apprentice programs. Most also offer other automotive courses, generally short courses for journeymen to upgrade their skills. Private trainers also offer such short courses. The third source involves the suppliers and manufacturers. In this section we discuss college programs, leaving the suppliers and manufacturers for the following section. Private trainers serve both markets, sharing the responsibilities of both the colleges and the suppliers, and are discussed in both these sections where appropriate.

It may be useful to start with an overview of the training process. Exhibit 6.1 on the next page gives a schematic representation of the career path, from a teenager through to retirement. Training generally starts in secondary school, where students are streamed into vocational or academic courses. People in the industry agree that the automotive trades appear to be a less attractive option for young people today; this is thought to be reinforced by family and peer attitudes, as noted in the left column of Exhibit 6.1. Guidance Counsellors also influence this choice, and may be responsible for steering students into other trades.

When a student leaves secondary school and chooses a career path, the selection is always guided by the availability of different jobs. If other jobs are available, and appear more attractive - shorter hours, better pay or working conditions - then fewer people will commit themselves to the automotive service sector. This influence continues to be felt throughout the apprentice period.

The employer at the garage - either an independent garage or a dealership - has a crucial role to play in encouraging the commitment to an apprenticeship. This commitment will take place if the working conditions are satisfactory, if the costs (particularly tools) are not prohibitive, and if the expected salary is competitive. The primary motivation to enter this trade - a love of cars - is often sufficient to get someone into the program, but may not be enough to keep them there.

Exhibit 6.1
Schematic Representation of Technician's Career Path


Non Job-Related Influences
Job Related Influences
Teenager
Family
Peers
HIGH SCHOOL
Guidance Counsellor
VOCATIONAL PROGRAM
Teacher
EMPLOYED BY GARAGE
Employer
APPRENTICESHIP AGREEMENT
Ministry Registration
Tool Costs
Wage Level
Alternative Jobs or Trades (higher pay)
Community College (theory)
COLLEGE TRAINING
EMPLOYER EXPERIENCE
Employer (hands-on experience)
LICENCED TECHNICIAN
Ministry
Red Seal
Alternative Industries
College Upgrading
Private Trainers
Manufacturers' Courses
SPECIALIST
SERVICE MANAGER
RETIREMENT

The colleges providing the classroom portion of the apprentice training are generally considered to be responsible for teaching the theory of automotive technology and service. Employers are expected to give the hands-on experience. Together, these two parties have the job of teaching the apprentices everything they need to know in order to get a licence and practice the trade. These responsibilities are not clearly divided, and there is some discussion about the amount of hands-on work the colleges should do, and the amount of theory the garages will handle.

Getting the licence is a major goal for all apprentices. Some see the licence as a ticket which guarantees a job, and as such is a valuable commodity in times of unemployment. If other jobs are available, however, the technician's licence is seen as an insurance policy against hard times. Newly qualified technicians may find work in other, more attractive jobs, and not use the licence unless job shortages force them back into the trade.

For those who do enter the automotive service trades, the awarding of the licence is the end of formal training. The journeyman may apply for certification under the Red Seal Program, which gives a national standard qualifying technicians to work in any province in the country. In some provinces, the Red Seal certification is a requirement for all those who wish to practice the trade. Just over half of the automotive apprentices who completed their training in 1985 wrote the Red Seal exam. Other than the mobility, many people in the industry indicated that the program is not seen as offering any great value to the technicians, because it is not regarded as a challenging and up-to-date standard for the industry.

The further training which the journeyman may take is either suggested by employers, or left up to the interest of the individual. Dealerships select technicians to go on annual courses put on by the manufacturers. All technicians may take the courses offered by private trainers, or by Community Colleges, but there is seldom any positive inducement to do so, aside from personal interest.

Through the course of the journeyman's first few years in the trade, certain specializations are likely to develop. These specializations will become the areas where the journeyman will take the trouble to keep up to date; other areas of the vehicle are less likely to be kept current. At this point, the technician's career reaches a peak; there is not much room for progress once the technician has a few years of experience. For a few, there is the opportunity to become a Service Manager, which takes them away from the regular practice of the trade. A few others may set up their own garages. But for the majority of technicians, their job will not vary much until they retire.

With this career path in mind, the following sections look at the aspects of the various training programs which affect the technicians' practice of the trade.

6.1 COLLEGE TRAINING PROGRAMS

This section profiles the apprentice programs offered by community colleges across the country. The apprentice program in Quebec is unique in Canada, in that the classroom work is completed in secondary schools, and the apprentice has a period of on the job training before becoming a journeyman. Each region in Quebec is responsible for its own apprentices, and for any upgrading which takes place. Only four regions have committees which are still active. Because of this fundamental difference in approach, the following discussion about college training does not apply to Quebec.

There are approximately 47 community colleges and institutes of technology which offer apprenticeship training programs in Canada. Their distribution by province is as follows:

Exhibit 6.2

Colleges offering Automotive Apprentice Programs in Canada, 1987

British Columbia	7
Alberta	8
Saskatchewan	2
Manitoba	2
Ontario	22
New Brunswick	3
Nova Scotia	1
Prince Edward Island	1
Newfoundland	1
Total	47

Source: Provincial Ministries

During our research, a number of comments were heard from people who thought that too many colleges were offering automotive apprentice programs. The average number of students per college ranges from 73 to 525, suggesting that some have greater costs per student than others, and that it may be economic to amalgamate some of the programs.

6.1.1 Program Specification

Exhibit 6.3 (on the following pages) presents the results of a survey carried out by Glen Hill of Red Deer College in Alberta. Information was gathered from colleges in every province on the definition of their apprentice training program, and details of their programming. While some of the differences listed in the table may be accounted for by the small sample (one college in each province), there are some interesting inferences to be drawn from this data.

There is a significant range of responses to the question on the duration of the in school part of the apprentice programs, from a high of 32 weeks (Alberta and Saskatchewan) to a low of 18 weeks (Newfoundland). Some of the shorter programs run pre-employment programs which may as a consequence demand less time of the formal apprentice course, but the difference is still remarkable. Another variance is in the staff-student ratio: it varies from 18:1 in B.C. and Manitoba to 12:1 in New Brunswick and Prince Edward Island.

From the responses to Question 6 on this survey, it appears that little importance is placed by the colleges themselves on improving the knowledge of their staff. These colleges indicate that almost no resources (time or money) are set aside to allow trainers to upgrade their knowledge.

Two changes in provincial programs have been noted over the past few years. A few provinces have increased the length of their programs by 1 week, while others have introduced a 2 year intensive 'Automotive Technology' program at some colleges. These programs cover the same material as the normal 4 year apprentice programs, but in more classroom time. At the end of the college program, the student is expected to spend 12 to 18 months with a garage before applying for a provincial licence.

The MAP 40 program, involving 40 weeks of intensive classroom training before the apprentice starts practical work in a garage, is a variation on this. The 1-2-3 program teaches fewer subjects in more detail at each stage in the program. It allows apprentices to be well trained in some aspects of the vehicle after the first classroom portion of their studies. Both these approaches give employers the opportunity to use apprentices who are fully trained in some aspect of the technology; this is thought to increase the value to the employer, and thereby reduce the cost of hiring an apprentice. While some employers have negative comments about the initial execution of these programs, most agree that these approaches are a viable alternative to the traditional apprentice program.

Exhibit 6.3

Survey of Provincial Apprentice Programs for Automotive Mechanics

	BRITISH COLUMBIA	ALBERTA	SASKATCHEWAN	MANITOBA
1. What are the entrance requirements for apprenticeship students?	Minimum Grade 10	Grade 9 or pass entrance exam	Grade 10	None. Grade 10 recommended
2. What method is used for teaching theory?	Lecture	Lecture	Lecture	Lecture
3. How many weeks are apprentices in attendance at school?	20 weeks (presently switching to 24 weeks) (4 years)	32 weeks (4 years)	32 weeks (just recently switched) (4 years)	22 weeks (4 years)
4. What is the required pass mark?	70%	70%	70%	70%
5. Do instructors specialize in subject material?	Some schools specialize--others teach all subjects	Some schools specialize--others teach all subjects	Specialize	Teach all subject
6. How are instructors updated?	Some schools have limited budget for updating--others do not	Schools have limited budget for updating	No budget for updating	Limited budget fo updating
	NOTE: All schools invite manufacturers to use their facilities and include instructors in manufacturer training.			
7. What is the ratio of classroom to shop time?	Guideline of 50-50	Guideline of 50-50	Guideline of 50-50	Guideline of 75% Lecture; 25% Sho
8. What is the student-instructor ratio in: (a) classroom? (b) shop?	**NOTE: These numbers are obtained from the schools contacted. Other schools may vary.**			
	a) 16 or 18:1 b) 16 or 18:1	a) 15:1 or 12:1 b) 15:2 or 12:1	a) 24:1 b) 12:1	a) 16 or 18:1 b) 16 or 18:1
9. Are live vehicles or mockups used for training in the shop?	Vehicles and mockups	Vehicles and mockups	Vehicles and mockups	Mockups only are used for demonstration. Student do very little disassembly, etc.
10. Is there an extended (2 yr.) Automotive Technology program available?	Some schools recently made this available--others are proposing same	Available at some schools	No	No
11. Is certification mandatory for mechanics/technicians?	No (A survey is underway to determine if there is a want for certification)	Yes	No	Each shop is required to emplo one Journeyman (not enforced)

Exhibit 6.3 (continued)

Survey of Provincial Apprentice Programs for Automotive Mechanics

ONTARIO	QUEBEC	NEW BRUNSWICK	NOVA SCOTIA	PRINCE EDWARD IS.	NEWFOUNDLAND
Grade 10	19 yrs. old with good academic background.	Grade 10 or equivalent	Grade 9	None. Grade 10 or equivalent recommended	None. Grade 10 or equivalent recommended
Lecture	Competency Based	Competency Based and Lecture	Competency Based	Competency Based (Not suited to Apprenticeship)	Competency Based
24 weeks (3 years)	Changing to 14 mos. full time	10 mos. Pre-employment. Plus 19 wks. (4 yrs.)	Guideline 24 wks. (4 years)	Guideline 24 wks. (4 years)	9 mos. Pre-employment. Plus 18 wks. (4 yrs.)
70%	60%. Don't use Interprovincial test	70%	70%	70%	70%
Some schools specialize--some teach all subjects	Some schools specialize--some teach all subjects	Specialize	Teach all subjects. Starting to specialize	Teach all subjects.	Teach all subjects.
Limited budgets available	No budget available. Instructors not released from teaching to attend updating. (Try to organize updating on weekends.)	Limited budget.	No budget available.	Very limited budget available	No budget. Sporadic updating done by manufacturers.
60% Classroom 40% Shop	Variable depend-on subject	35% Classroom 65% Shop (Lectures done in Shop)	Variable by student ability	Guideline: 50-50	40% Classroom 60% Shop
a) 30:1 b) 15:1	a) 20+:1 b) 20+:1	a) 12:1 b) 12:1	a) 10:1 b) 10:1	a) 12:1 b) 12:1	a) 15:1 b) 15:1
Vehicles and mockups. Shop work consists of diagnosis and testing only	Vehicles and mockups	Vehicles and mockups	Vehicles and mockups	Vehicles and mockups	Vehicles and mockups
40 wks. school followed by 180 hrs. updating	No	No	No	2 yr. program plus 1 1/2-2 yrs. experience to qualify for Journeyman	3 yr. technology Gr. 12 pre-requisite (9 mos. per year)
Yes	No	Yes--three certificates available. Not enforced	Yes	No	Yes

Source: Survey by Glen Hill of Red Deer College

6.1.2 Curriculum

A profile of the curricula for the apprentice programs for each province is presented in Appendix 4. All the programs offer roughly the same topics, with the differences primarily in the weighting of the different subjects. However, some of these programs have not been revised for many years, so the inclusion of a subject may not be a guarantee of its current content.

Many interviewees believed that the curriculum cannot be changed quickly enough. Trainers see the need for changes in the curriculum, but must await the instruction of the provincial ministry, through the Provincial Advisory Committee (PAC), before changes can be made. Each PAC is made up of members of the industry and the Provincial Ministry responsible for apprenticeship training, in order to facilitate an information exchange about the industry needs for training. They meet every four or six months to discuss the changes in college curriculum which should take place in about 12 months' time, Many members of the industry, however, have lost respect for the PACs, because of what they believe to be an inability to act quickly.

An Interprovincial Standards Committee has been formed, with representatives from each of the provinces, to co-ordinate the discussion of curriculum across the country. It allows information on programming needs to be shared between the provinces. This committee is also responsible for the Red Seal Program, which provides the only nationally recognized qualification for automotive service technicians.

It is difficult to design a course which meets the needs of both dealers and independent garages. Dealers acknowledge the need for general education, but would like as much as possible to keep the focus on the needs of their particular vehicles. Independent garages, on the other hand, want colleges to cover as wide a variety of makes and models as possible, in order to prepare the apprentices for life in a generalist shop. Trainers feel pressures from both sides.

Trainers see the role of the colleges as the providers of theory and generic practice, leaving hands-on experience to garages. Most trainers reported a severe time constraint on the teaching of their apprenticeship programs. Not only must they cover the curriculum of 10 years ago, which is still applicable for older vehicles, but they are expected to teach all the new technology which has been introduced in the interim. When a choice has to be made on what to include and what to leave out, trainers generally feel that they are responsible for providing the theory, and the experience will come from the months of the year apprentices spend in the shop. This is not an easy decision to make, as trainers acknowledge the value in providing supervised hands-on experience.

6.1.3 Resources

In general, all the college trainers interviewed for this study agreed that there was a major constraint on the abilities of colleges to change with the times, due to the limited financial resources available to them. All community college programs require funding to improve their programs on a regular basis; the automotive programs have more pressing needs, simply because the capital investment in their facilities is so much higher that that for other courses.

The distribution of new cars, assemblies and equipment to colleges is not handled equitably. Each college solicits manufacturers for donations of vehicles. There are not enough for every college, however, so manufacturers make a judgement as to which college should get the available equipment. Since the manufacturers do not co-ordinate this work, there have been cases when some colleges have received large shipments from several suppliers while other colleges have received nothing.

The issue requires a co-ordination of effort to ensure an equitable distribution of the available equipment. It also requires either an increase in the amount of equipment available, or a decrease in the number of colleges which need to be supplied.

6.1.4 Upgrading Trainers

Colleges also face the problem of updating the knowledge of their trainers, in order to give students an awareness of the new developments in vehicles; this is also a function of the money available. Each college hosts regional gatherings of dealers for the manufacturers to present new products, and the trainers are generally invited to sit in on these sessions. Through these meetings, trainers are able to catch up on many new developments, but not all trainers attend, due to classroom commitments, and each college deals with only one or two manufacturers. There is still a considerable amount of knowledge which does not get transferred to the college, and hence to the students.

While most trainers we spoke to admitted that this lack of current equipment and knowledge was a problem for the programs, most were resigned to the fact that little or no funding was available to alleviate the problem.

Trainers believe that upgrading should be made an explicit part of the trainer's job. Upgrading is handled on an ad hoc basis at present: if trainers wish to devote their own time to increasing their knowledge, they are free to do so. However, colleges will give little or no time or money to allow such upgrading to take place during normal working hours. In addition, trainers get no financial rewards for doing this extra work; the only courses which have an impact in a salary review are university level courses. Our interviews suggest that few trainers routinely upgrade their skills.

Almost all the people questioned on this topic agreed that the college trainers required a systematic way of upgrading their skills regularly. This would do much to restore some confidence in the quality of the apprentice program, and would better prepare apprentices for the current automotive technology.

6.2 THE RELATIONSHIP BETWEEN MANUFACTURERS AND COLLEGES

Motor vehicle manufacturers and importers emphasize the importance of the community colleges in the training of tomorrow's technicians, but are concerned about some of their capabilities. The new technologies demand new skills from today's technicians and apprentices, a requirement that will be particularly acute in the early 1990's when vehicles have more advanced technologies, and the current generation of technology may be expected to require more repair. Community colleges, in conjunction with dealers, are seen as crucial to ensuring that the new apprentices have sufficient technical skills, but manufacturers question whether the colleges have teachers with sufficient understanding of the new technologies to do their training properly.

6.2.1 College Needs

Manufacturers believe that the trainers need training in advanced technologies. Some have noted that the trainers are comfortable with mechanical principles that were employed in previous generations of vehicles, but that they do not have sufficient grasp of technologies such as port and throttle body fuel injection, ABS braking, 4 wheel steering and on-board computers.

Manufacturers believe that the community colleges have equipment that is outdated and unsuited to the training of tomorrow's technicians. Several have noted that vehicles with carburettors will become a "thing of the past", but that teachers do not have enough fuel injected engines, particularly engines with problems needing rectifying, to train their students. While it is acknowledged that a sound knowledge of the basics (including carburettors) continues to be important, the most significant gap in the apprenticeship curriculum is in the support of new technologies.

Many have noted that colleges lack the sophisticated electronic diagnostic equipment required to assess electronic repair problems in their vehicles. Each manufacturer was able to identify at least one exception to this, but felt that this comment was applicable to the majority of colleges.

Manufacturers can see that some colleges are better supplied than others, affecting the quality of the training for the apprentices and the extent to which apprentices are trained on several types of vehicles. Some colleges develop a particularly strong rapport with one manufacturer, getting equipment on a regular basis. This keeps them up-to-date, but focuses the training on technologies or approaches used by that supplier, and not on those in common use by other manufacturers (e.g., 16 valve engines, vendor specific transmissions, etc.). Suppliers of all equipment recognize that procurement is a problem, but do not see an easy solution, and do not feel that it is their specific company's responsibility to support the training of all technicians, whether they work for their dealers or not. One manufacturer has in the past worked with a provincial government official who has co-ordinated the distribution of parts and vehicles to colleges. This system was considered workable, and might be revived to ensure a more equitable placement of new automotive parts and vehicles among all colleges. Diagnostic equipment at colleges is also seen to be outdated and insufficient for the numbers in the student body, making it difficult for students to learn in a realistic environment.

6.2.2 College Curriculum

Manufacturers consider the colleges' curriculum out-of-date and inconsistent. They suggest that the curriculum for colleges should be constantly reviewed and brought up-to-date. Variations in curricula across the country may not be warranted, and could be examined to determine whether differences are required and how anomalies can be resolved. Most suppliers feel that the solution for this problem involves national standards of training; some believe that the general level of ability needs to be raised, but all agree that training programs should be comparable across the country.

Courses which the manufacturers feel need to be better and more consistently addressed by the colleges include electronics, hydraulics and customer relations. Other suggestions for revisions in the community college courses include smaller classes, and changing the curriculum to allow each year's course to train the apprentices fully in one aspect of the technology (the 1-2-3 approach).

6.2.3 Dealer Training

All manufacturers consider the annual training programs for their dealers to be an important part of their operations. While there are some differences in the programs offered, all the manufacturers provide courses on generic new technologies (eg. electronic fuel injection) as well as the specific features of new models. There is an emphasis in these courses on diagnostics. As one manufacturer said, "We expect technicians to be able to take things apart already. We train them to identify the problems".

Several manufacturers and importers felt that dealers in general plan for the short-term; long-term issues such as employee training appear less important to them, and result in little action. They note the difficulty in getting the dealers to release their technicians for training and the apparent reluctance of the dealers to train all of their employees. In addition, in some cases there appears to be a concern that the technicians, once trained, may be poached by other dealerships, and that some dealers could be discouraging training as a result.

Manufacturers try to put as many of the dealers' technicians through their programs as possible but find it difficult to get as many technicians involved as they would like. Some dealers feel they cannot afford to be without more than one staff member, or cannot afford to pay more than one salary of a non-productive member of their team. Most manufacturers insist that at least one technician attend from each dealership. They note that providing an incentive for the technician to attend these courses is important; attendance must be voluntary, but there must be sufficient inducement to encourage the technicians to participate. Technicians should not lose income as a result of their attendance. Some dealers use the attendance as a reward to valuable technicians; while this puts the course in a favourable light, it does not necessarily get those technicians most in need of training to attend.

6.3 SUMMARY AND IMPLICATIONS

Community Colleges have two problems in adapting their apprenticeship programs to the changing needs of the industry. The first is their limited funds for buying new equipment and examples of the new technologies they should be teaching, and the second is the difficulty of upgrading the skills of the trainers to include a working knowledge of the new technologies. A third problem is the inability of the industry itself to attract the brightest students to this program, due to the poor image of the trade. This industry problem may reflect on the ability of the colleges to produce a high standard of technician. Each of these problems will have to be addressed if the apprenticeship program is to meet the challenge of the 1990's.

Manufacturers already provide considerable training to the staff of their dealerships, and generous support for the community college programs, through the provision of equipment, vehicles, manuals and some training for the staff. At present, this is done on an ad hoc basis by manufacturers individually. The dealers and colleges rely on the manufacturers for this information and equipment; no other participant in the industry could supply it for them. This is a significant role for the manufacturers, requiring a commitment of time and resources to fulfil.

Manufacturers are concerned about the lack of standards of qualification across the country. A technician licenced in one province is not necessarily as well qualified as one licenced in another province; the implication is that some customers are not being as well served in some parts of the country as they should be. It is impossible to evaluate the strength of this argument without a massive testing program. However, there is no evidence that consumers are having consistently bad service in any one province, even though there may be demonstrable differences in the training programs which prepared the technicians for the trade. The establishment of a national standard is in the interests of the workforce, who may travel from province to province and need a qualification which is respected everywhere. It is also in the interests of the manufacturers, who need to manage a workforce on a national basis, and need consistent standards by which to measure performance. Their argument is that the vehicle is standard across the country, so the service to that vehicle should also be standard.

7.0 HUMAN RESOURCE PLANNING FOR THE FUTURE

This chapter presents a discussion of the implications of this analysis for the industry, in terms of the planning for manpower, and the skills required to serve the market. The first section presents the key issues which have come out of the research for this study, and the second section presents some approaches which might resolve the issues.

7.1 MAJOR ISSUES

From our discussions throughout this industry, it is clear that people in all sectors require assurance that there will be sufficient technicians available in the future to meet their needs. They also need to be confident that the quality of the available technicians will be up to the necessary standard. When there is a surplus of technicians in this trade, there is an opportunity for employers to select the best, setting their own standards for quality; if there is undersupply, then employers must take any technicians who are available. Both these requirements have short term and long term aspects, and relate to the two types of training - apprenticeship and retraining programs.

The apprentice program is designed to train good basic general technicians. This was appropriate for the service industry of the past, when most technicians worked on all aspects of the vehicle. The developments of technology and the proliferation of makes of vehicle over the last decade, however, make the generalist approach increasingly difficult to support. Technicians have told us that they have been forced to specialize to some extent, focussing either on one make of vehicle, or on one aspect of the vehicle, such as transmissions.

In our interviews, tradesmen and employers have been trying to identify the changes which will need to be made to the apprenticeship program to address this fundamental change in the technician's trade. The apprenticeship program was designed to meet the needs of the traditional generalist technician. Most people believe this approach is still appropriate today. There may be further benchmarks, however, which the industry needs to evaluate and ultimately accept regarding specialist skills. These specialized skills will need to become set and recognized as important qualifications in the training of a technician, either as part of the initial certification process, or as upgrades taken after certification.

Some believe that the most useful solution would be to establish a basic technician level having general training supplied by the apprentice program, and then a variety of advanced qualifications, such as electronics technician, or powertrain technician to follow throughout the career of the journeyman. For this to be effective, there will need to be a series of proficiency tests for each course, to establish entry level criteria, and ability level standards upon completion of the training.

The following sections discuss the aspects of the training programs, both apprenticeship and retraining, which need attention in order to develop a system which meets the needs of the industry.

7.1.1 Apprentice Program

Those we interviewed felt that, although the apprenticeship program may not be ideal - there has been much discussion about the problems of the program - no one wants to get rid of it. Its approach is not wrong, although there may be some details which need altering.

There are four challenges facing the colleges which run the classroom portions of the apprentice program: the first is to attract the right applicants, the second is to develop the appropriate curriculum, the third is to train the trainers with the skills required to teach that curriculum, and the fourth challenge is to get the equipment required to support the program.

In order to attract the right applicants, the industry needs to decide what the requisite skills are for this trade, and what the appropriate aptitude is. Once this is done, the information must be made available to the vocational programs of the secondary schools, for young people trying to select a trade. The challenge will then be to alter the perception of the trade in the schools, in order to make sure that the students best qualified for this trade want to apply.

The curriculum must be changed to meet the needs of industry - not of today, but of four years in the future. This requires the direct input of industry experts, particularly the manufacturers, to help shape the courses and define the necessary subjects. The present mechanism of the Provincial Advisory Committees provides this input already. Many of the people we interviewed were critical about the PACs, particularly with respect to the time required to accomplish any change. The PACs must be put in a position which allows them to respond more quickly to the changing needs of the industry, and the colleges must be primed to act swiftly on this advice. This must be a recurring process, so that the college curriculum is not permitted to lapse behind the realities of the industry. Many in the industry believe that the curriculum needs to be standardized across all the provinces, to maintain a consistent level of expertise.

At the same time, a program must be instituted to upgrade college trainers. The college administration must make such upgrading an explicit part of the work of every trainer, on an annual basis. There should be time set aside during the year to take part in this upgrading, and there should be some incentive for the trainers to take advantage of as much of the upgrading as possible. The first step will be the biggest, to bring the trainers up to date to present technologies. Courses must be organized to provide trainers with the immediate upgrading; input from the manufacturers and the PAC's will be required to see that this upgrading is meeting appropriate standards. Following this period of implementation, there will need to be a recurring program established to keep the trainers abreast of new developments.

Finally, the college facilities will need to be upgraded as well, to provide sufficient supply of up to date equipment, parts and vehicles. This will require substantial support from the manufacturers of vehicles and of other equipment; there is no presumption that it is the duty of the manufacturers to provide all the equipment on a charitable basis. Some funding will have to be found to pay to re-equip these programs, and to provide them with sufficient funds to keep their programs up to date.

The licencing of technicians is established in order to guarantee a minimum level of quality of work. This is generally done to protect the consumer. The level of ability which is set for licencing should ensure that the consumer will always find a technician who knows enough about the vehicle to perform standard repairs.

It is relatively straightforward to develop the standards for licencing of new entrants to this trade. It can be done in parallel with the new curriculum for the apprenticeship program, and reflect the dynamics of that process, with annual reviews. The disadvantage of this process is that a licence awarded in one year may not be equivalent to ones awarded in following years. This might lead to the need for recertification on a continuing basis.

7.1.2 Retraining Journeymen Technicians

From the analysis in Chapter 5, it seems clear that the problem facing the industry today is the lack of technicians who have the appropriate skills. Not only must the industry aim to attract better entrants, but they must improve the ability of the trade as a whole. This means that the existing labour force must be brought up to these standards.

Chapter 4 indicated that it may be appropriate in the future to establish two levels of automotive technician: one to handle the very sophisticated new technologies, and another to handle the large volume of more mundane tasks which require less knowledge and ability. This was suggested by the technological changes in the industry which will make it easier for some diagnostic and repair tasks to be done in a fairly automatic fashion. The technology will continue to require the attention of highly skilled master technicians from time to time, on more difficult problems.

The industry is attempting to cope in the midst of technological changes taking place. In ten years time, it may be that much of today's new technology will be readily understood and serviced by technicians, particularly if changes are made to incorporate new technology in the apprenticeship and retraining programs. Many levels of specialty and proficiency may evolve over the next ten years. In the short term, however, the industry faces a major challenge to retain its existing workforce, to attract back some of those it has lost, and to retrain these quickly to enable adequate servicing to occur while waiting for the output of longer term changes in recruiting and training apprentices to develop.

There will need to be two aspects to the retraining curriculum: one to cover a general awareness of the overall trends in the new technologies (such as electronics, and the interconnections of the the control grid) and others to cover all the detailed information which technicians need to work in their specific disciplines (such as transmissions).

Employers can see that some qualified technicians will not be retrained, either because they do not want to, or because they do not have the ability to adapt to the new technologies. For many this will not be a problem, as the old technologies will continue to require attention for at least another 10 years. But there is not much opportunity for those who see their lives in this trade lasting more than 10 years to survive without adapting to the new technologies.

Employers realize that in the long term, a program must be developed to provide retraining on a regular basis, so that the trade does not fall behind again. Part of this will require the institution of recognized courses to cover the appropriate topics, and part will need a different approach to the trade, so that technicians will expect to take these courses regularly as part of their professional development.

The aspect of the retraining program which will require immediate attention will be the incentives for taking any retraining. At present, the only incentive is negative: if the technician does not retrain, he may be out of a job. Some positive incentives which might be used are status symbols, salary increases, bonuses, or promotions. The technician must be confident that the training program is worth the effort, and that there is a worthwhile future in this trade. If the trade is to offer individuals a bright career, the industry will need to examine its payment system and working conditions, in order to make it attractive to the technicians already in it.

The setting of standards for journeymen technicians will require two processes. One will test the knowledge of a journeyman who wishes to take an upgrading course, to ensure that he has the requisite knowledge to participate in a course at this level. The second is to evaluate the technician's new ability level once the course is completed. Standards of entrance and graduate ability will need to be set. It will be appropriate to have various levels of courses on each topic, to allow technicians to progress in a subject area at a speed which is productive. It is imperative, however, that standards be set, so that the employers and the consumers can both have confidence in the trade.

7.2 APPROACHES TO RESOLUTION

The approaches which might be taken to resolving the issues facing this trade can be defined by the identifying the needs for support, and the possible sources of such support. We discuss each of these under the headings of the two kinds of support required to address the issues outlined above, information and equipment.

7.2.1 Information

In order to develop a curriculum for apprentices, there has to be information about the technologies of today and tomorrow. In order to specify the minimum standards of ability for the trade, there must be information about the tasks to be performed and acceptable level of accomplishment. In order to attract a better student to the apprentice programs and the trade, information is needed on what the most appropriate characteristics are for this trade. All the issues discussed in the first half of this chapter require considerable expert information before they can be solved.

The most plentiful source of information in this industry is the manufacturer. Most information about changes in vehicles originates with the manufacturer. Private trainers are proud to be as up to date as anyone else in the industry, relying as they do on the information the manufacturers are willing to disclose. Dealers are direct recipients of information from the manufacturers; allowing for the time lag to move information from the manufacturer, they are close to being as well informed as they need to be. The extent to which up to date information is transferred to others in the industry would appear to be somewhat patchy, but is clearly needed.

7.2.2 Equipment

Motor vehicle manufacturers, parts manufacturers and diagnostic equipment manufacturers, and the importers and distributors of this equipment are all possible sources for the supply of new technologies to community colleges. Each of these groups also provides some training on their equipment to their customers.

Colleges, private trainers, dealers and independent garages are all in need of new equipment. For most of these, the decision is a purely commercial one; because of the high price of most of this equipment, any purchaser must be assured of high utilization of the equipment before making the investment. At the moment, colleges and trainers are in a position where they often need to beg for equipment to remain up to date. Industry and trainers will need to consider ways to co-operate to allow for more access to equipment in an equitable manner.

7.3 SUMMARY AND IMPLICATIONS

The primary conclusion from this section is that there is a need for better co-operation among the various sectors in this industry. The only formal exchange of information or expertise which takes place in this industry today is the dialogue between manufacturers and their dealers. All other transfers of expertise happen on an ad hoc basis, with the exception of the work done by private trainers. From our work, it is clear that there is a need for better transfers of information and expertise within the industry, and between the industry and the colleges.

Clearly sectors of this industry will want to protect their own competitive positions. But unless the transfer of expertise is improved for colleges, there is little likelihood of the issues described in this study being addressed. It is possible that, if this transfer of expertise does not take place, some manufacturers may decide to establish their own programs, and isolate themselves from the public system altogether.

The three issues relating to training and human resource planning which need addressing for the automotive service trade are retraining journeymen technicians, attracting and training apprentices, and setting standards of ability. Each of these has a short term aspect - in response to the present situation - and a long term aspect - to set up a process to avoid getting into the present situation again.

Journeymen technicians require retraining in the new technological developments described in Chapter 4, in order to meet the demands of the marketplace. Some positive incentive is necessary to stimulate this retraining, and to make explicit the value of the new skills. While some of the curriculum should give an overview of the new technologies, most of the focus will be on specific areas of expertise. The long term objective must be to provide such retraining on an annual basis.

In order to attract better people into the trade, it is imperative to define what the attributes of a 'better person' are, in terms of abilities and aptitudes. The second step should be to create an atmosphere in which such a person would like to work, and to ensure that the prospective applicants (secondary students) are aware of the attractions of the trade.

The automotive apprenticeship program needs to be updated to prepare apprentices for the vehicles of today and tomorrow. This involves redesigning the curriculum, investing in new equipment, and upgrading the trainers so that they have the knowledge and ability to teach the students. A process must be established, on a long term basis, to ensure that each of these aspects of the apprenticeship program remains up to date.

Finally, standards need to be set for the licencing of new technicians, and ensuring the ability of retrained journeymen. It is in the interests of the consumer that every technician keep up to date, and standards need to be set to provide a benchmark by which the technician can evaluate his knowledge.

The resolution of these issues depends on the provision of information, equipment and expertise. The manufacturers, as the source of new technologies, are seen to be the disseminators of most information and expertise, as well as the obvious source of equipment and vehicles. Both the dealers and the private trainers are quick to catch up on the knowledge of the manufacturers, and might be considered secondary sources for the colleges, and even for the independent garages.

Appendix 1.

Steering Committee Members

HUMAN RESOURCE STUDY OF THE AUTOMOTIVE SERVICE, REPAIR AND PARTS DISTRIBUTION INDUSTRY

STEERING COMMITTEE

INDUSTRY

Ron Brown
President
Aftermarket Training Corporation
Oakville, Ontario

Bill Burkimsher
Executive Director
Automotive Aftermarket Retailers of Ontario
Oakville, Ontario

Robert Chattaway
Project Coordinator
Apprenticeship Recruiting
Volkswagen Canada Ltd.
Scarborough, Ontario

Norman Clark
President
Motor Vehicle Manufacturers' Association
Toronto, Ontario

Peter Dawes
Executive Director
Automobile Importers of Canada
Toronto, Ontario

Laurence Donnell
Service Manager
Belmont Chevrolet-Oldsmobile Limited
Weston, Ontario

Ken Hawkeswood
President
Hawkeswood Garage Ltd.
Windsor, Ontario

Glenn Hewlett
Automotive Aftermarket Retailers of Ontario
Mississauga, Ontario

Brian Hickey
Secretary-Treasurer
Motor Vehicle Manufacturers' Association
Toronto, Ontario

John Long
Manager, Education and Training
General Motors of Canada
Oshawa, Ontario

Bill Payne
President
Automotive Finishes and Supply Ltd.
Toronto, Ontario

Duncan Read
Director of Industry Relations
Federation of Automobile Dealer Associations of Canada
Willowdale, Ontario

Bill Rowley
Technical Training Supervisor
National Service Office
Ford Motor Company of Canada, Limited
Oakville, Ontario

Dean Wilson
President
Automotive Industries Association of Canada
Ottawa, Ontario

COMMUNITY COLLEGES

Gerhard Gedies
A / Dean, School of Technology
Fanshawe College of Applied Arts and Technology
London, Ontario

Blake Gordon
Department Head
Automotive-Diesel Department
Southern Alberta Institute of Technology
Calgary, Alberta

Glen Hill
Instructor
Technical Training Division
Red Deer College
Red Deer, Alberta

Peter Watson
Chairman, Skills Training
School of Engineering Technology
Georgian College
Barrie, Ontario

GOVERNMENT

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Director, Research and Special Studies
Labour Market Outlook and Structural Analysis
Employment and Immigration Canada
Ottawa, Ontario

Réal Gauvin
Direction General de la Formation professionnelle
Ministère de la Main-d'oeuvre et de la Sécurité du revenu
Gouvernement du Québec
Québec, Québec

Wayne Green
Assistant Deputy Minister, Planning and Administration
Department of Career Development and Advanced Studies
Government of Newfoundland
St. John's, Newfoundland

Roger Harley
Research and Planning Officer
Ministry of Advanced Education and Training
Government of New Brunswick
Fredericton, New Brunswick

Bill Lampert
Manager, Human Resource Planning and Sector Studies
Ministry of Skills Development
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Senior Analyst, Research and Special Studies
Labour Market Outlook and Structural Analysis
Employment and Immigration Canada
Ottawa, Ontario

Mike McGrath
Industrial Consultant, Labour Market Services
Employment and Immigration Canada
Ottawa, Ontario

Derwyn Sangster
Director General, Labour Market Outlook and
Structural Analysis
Employment and Immigration Canada
Ottawa, Ontario

Andrew Shepherd
Policy and Planning Branch
Ministry of Skills Development
Government of Ontario
Toronto, Ontario

Appendix 2.

People Interviewed

People Interviewed for this Study

NAME	ORGANIZATION
Manufacturers and Importers	
Walt Love	General Motors
Ken Gilboe	Chrysler Canada
Rick Betteridge	Chrysler Canada
Al Morgan	Chrysler Canada
Bill Rowley	Ford Canada
Larry Johnson	Ford Canada
Jim Boyle	American Motors
Wray Winger	Nissan Automobile Company
Norm Woods	Hyundai Auto Canada Inc.
Tom Faulds	Honda Canada Inc.
Kazuo Miyazawa	Toyota Canada Inc.
Peter Tschoepe	Toyota Canada Inc.
Wes Pratt	Toyota Canada Inc.
Alan Acheson	Mazda Canada Inc.
Robert Chattaway	Volkswagen Canada
Klaus Luttmann	Volkswagen Canada
Parts Suppliers and Wholesalers, Toronto	
Jack Davies	Davies Auto Electric
Doug Bennett	Hayes Dana Inc.
Gord Moore	Motive Parts & Equipment Ltd.
Dealers, Toronto	
Norman McQuaid	West End Chrysler
Jim Croft	Cruickshank Motors
Jim Paton	York Volkswagen
Werner Richter	York Volkswagen
Dave Baker	Baker Sales & Service
Gordon Dowey	Raceway Chrysler
Lawrence Donnell	Belmont Chev-Olds
Harry Lawson	Don Howson Chev-Olds
Tom Tonks	T.A.D.A.
Independent Garages, Halifax	
Graham Conrad	ESSO Service Station
Dale Bancroft	ESSO Service Station
Brian Upton	ESSO Service Station
Austin Kennedy	
Tom Henneberry	

Body Shops, Toronto

Sandy Liguori	Woodchester Coll.
Roger Bourdeau	Don's Collision Centre
David Hay	Town Auto Body
Bill Payne	Auto Finishes & Supply
Norris Smith	Norris Smith Auto Body
R. Gailus	Gailus Garage Ltd.
Lybron Neblett	Harbourview Collision
Heing Fuhrina	Fuhrina Auto Body Ltd.
Jack Sohn	Speedy Motors Ltd.

College Trainers, Fanshawe College

Henry Pietens	Farm Equipment Mechanics
Bill Peddie	Motive Power
John MacDonald	Motive Power
Bill Denbok	Electric & Fuel Systems
Gerry Heggarity	Collision
Raymond Smith	Heavy Equipment
Ron Smeto	M.V.M Coordinator
W. Bond	Electric & Fuel Systems
R. Cameron	Interim Divisional Chairman
J. MacCabe	Electronic/Fuel Systems

Apprentice Students, Fanshawe College

Ian Williams	MVM Advanced
Jeff Coulbeck	MVM Advanced
Chris Abel	MVM Advanced
Diego Vitello	MVM Advanced
Roy Andersson	MVM Advanced
Nick Kosmal	Auto Technician
Neal Cockshutt	Motive Power Technician
Rob Pews	Motive Power Technician
Chuck Viaene	Parts & Mech

Dealers, Halifax

Eric MacLellan	MacLellan Lincoln Mercury Sales Ltd.
Brian Smith	Dartmouth Dodge Chrysler Ltd.
Stephen Megaffin	Colonial Honda
Reg Campbell	Colonial Honda
Don Burke	Fairley & Stevens Ltd.
Harvey MacDonald	Chebucto Ford Sales Ltd.

Independent Chains, Toronto

Jim Borland	Canadian Tire Associate Dealer
Garry Fiss	Woolco Automotive
John L. Fisher	Woolco Dept. Stores
John B. Walby	Imperial Oil Ltd.
J. Douglas Alexander	Canadian Tire Associate Store
Peter Millard	Canadian Tire
Steve Quinn	Canadian Tire
Bob Dugas	Goodyear
Eric Palimon	Goodyear
Bruno Piva	Midas Muffler
Mr. Ross	Green & Ross

Trainers, Red Deer College

Glen Hill
Joe Prefontaine
Mel Hines
Barry Fizer
Dale Thomas
Bob Schatz

Apprentice Students, Red Deer College

Brian Albers
Ronald Bakx
Thomas Fisher
Jack Hummel
Rod James
David Kelly
Eric Klein
Nick Lesher
Larry Murphy
Emmett O'Brien

Dealers, Calgary

Trevor Roberts	Universal Mercury Lincoln
George Jones	Shaw GM Trucks
John Chorny	Select Auto (Rolls Royce Jaguar Ferrari)
Glen Narfason	Big Four Motors (Chrysler, Jeep)
Jack Thompson	Kramer Auto Sales (Mazda, BMW, Mercedes)
Ted Valentine	Halford and Valentine (Volvo)
Barry Eldstrom	T & T Honda
Larry Shaw	Shaw GMC
Ray Glenville	Calgary Motor Dealers Association

Independent Garages, Calgary

Jim Garside	Trio Motors Limited
Albert Glendinning	Executive Auto Service

Dealers, Montreal

Claude Chasse	Toyota
Pierre Cloutier	GM
Sylvain Leroux	Renault
S. Liberian	Subaru - Nissan
Andre Papineau	Chrysler
Jacques Risdon	Volkswagen

Independent Garages, Montreal

Raymond Cataro	Atelier de mecanique Remo Enrg.
Real Levesque	Auto Services Alignement Real Inc.
Dora Saint-Pierre	Petro Canada
Jean-Claude Taillandier	Atelier La Garagerie Inc.

Mechanics, Montreal

Robert Barbeau	J.P. Charbonneau
Denis Caron	Lalonde Chevrolet
Remi Gagnon	Salois Chevrolet
Rene Gagnon	Boulevard Pontiac
Gilles Gougeon	Salois Chevrolet
Owen Johnson	Barnabe Chevrolet
Jean-Yves Rondeau	Chomedey Ford
Louis St.-Laurent	Omer Barre
Emile Touchette	Touchette Automobile

Mechanics, Cambridge Ontario

Oscar Martin	Waterloo County Board of Education
Thomas Diefor	Tom's Place
Don Dunn	Big Dee's Alignment & Brake Service
Lawrie Smith	Lawrie Smith Mechanics Inc.
Earl Swan	Reg Halls Auto Service
Helmuth Slisarenko	Guelph Brock Road Garage Ltd.
Cam Marshall	Cambridge Ply Chrysler Ltd.
George M. Phelps	Canadian Tire Corporation
Norm Perriman	Norm's Repairs
Garfield Gadke	Goods Garage St. Jacobs
Frank Heiligenthal	Import Auto-Mobile Service
Ron Brown	Aftermarket Training Corp Ltd.

Automotive Industry - General, Calgary

Bill Nyerod	Alberta Body Shop Apprentice Program
Harley Saunders	Alberta Mechanic Apprentice Program
Rolf Heiligsetzer	Independent Body Shop
Darryl Muir	Partsperson (dealership)
Mavis Muir	Partsperson
Don Murray	Canadian Tire Corp. Service Manager
Ernie Brucker	Alberta Mechanic Apprentice Program
Ross Scott	Independent Garage
Blake Gordon	Head of SAIT Automotive Training Prgm
Maurice Buffel	Asst. Department Head, SAIT Automotive Training
Ted Weizel	Independent Garage

Independent Garages, Toronto

Anna Sabucco	Sil's Service Centre
Maurizio Cochi	One Stop Auto Centre
Fred Williams	Williams Auto Centre
John Eggleston	Parkview Shell Service
Len Wells	Wells Esso
Glenn Hewlett	Automotive Aftermarket Retailers
Bill Burkimsher	Automotive Aftermarket Retailers
Trevor Jones	Vandorf Garage
Andy MacKereth	Crown Steering And Brakes
Ross Nash	Nash Garage Limited
Wally Clayson	Wally Clayson Service Station

Trade Associations

Brian Hickey	Motor Vehicle Manufacturers Association
Norman Clark	Motor Vehicle Manufacturers Association
Dean Wilson	Automotive Industries Association of Canada
Duncan Read	Federation of Automobile Dealer Associations
Peter Dawes	Automotive Importers of Canada

Independent Garages, Ontario

Don Bell	Bell's Garage, Bridgeworth
Brian Gallagher	Gallagher's Garage Ltd., Kanata
Judy Gallagher	Gallagher's Garage Ltd., Kanata
Maurizio Cochi	One Stop Auto Centre, Woodbridge
Jim Worgan	Independent Consultant
Anna Sabucco	Sil's Service Centre, Mississauga
Doug Jordan	AIA
Diane Freeman	AARO

Government

Graham Robertson	Occupational and Career Information Branch, CEIC
Kathy Laing	Occupational and Career Information Branch, CEIC
Aline McRory	Occupational and Career Information Branch, CEIC
Paul Stoll	Labour Market Outlook and Structural Analysis,CEIC
Paul Montpetit	Interprovincial Standards Committee, CEIC
Louis Dalton	Apprenticeship and Industrial Training, Department of Industry, P.E.I.
Jim Landthier	Ministry of Skills Development, Ontario
Ron Rocheleau	Labour Market Outlook and Structural Analysis,CEIC
Jean Nadeau	Ministry of Advance Education & Planning, New Brunswick
Wayne Green	Department of Career Development & Advanced Studies, Newfoundland
Paul MacNeil	Regional Manager, Nova Scotia, CEIC
Réal Gauvin	Ministère de la Main-d'oeuvre et de la Sécurité du revenu, Québec
Rob Swaffield	Ministry of Skills Development, Ontario
Kim Boydell	Labour Market Outlook and Structural Analysis,CEIC
Ed Doyle	Labour Market Outlook and Structural Analysis,CEIC
Bob Wilson	Labour Market Outlook and Structural Analysis,CEIC

Colleges

Glen Hill	Red Deer College, Alberta
Gerhard Gedies	Fanshaw College, Ontario
Gordon Tardoff	Caribou College, B.C.
Frank Stevens	Caribou College
Terry Fletcher,	British Columbia Institute of Technology, B.C.
Leon Conyers	Malaspina, B.C.
Ollie Hajzler	Red River College, Manitoba
Sandy MacDonald	Durham College, Ontario
Peter Hoystead	Canadian Automotive Institute, Georgian College, Ontario

Insurance Industry

William G. Lamb	Commercial Union Assurance
Norm Clark	Insurance Bureau of Canada
Wayne Eaton	Sun Alliance Insurance

Automotive Industry

Ken Hawkeswood	Hawkeswood Garage Limited, Windsor
Ron Weiner	Automotive Service Excellence Program
Bob Rymarchuk	Nissan Dealership, Winnipeg
Bill Redpath	Four Bridges Auto, Vancouver
Mike Austin	Mike Austin's Master Mechanics
Larry Kelly	Kelly's Body Shop, Hamilton
Paul Mike	Doug Leggett Pontiac, Burlington

Appendix 3.

Provincial Apprenticeship Data

Provincial Apprenticeship Program Enrollment

Newfoundland	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**
Motor Vehicle Body Repairer	82							
Entered	38	48	37	40	34	27	22	24
Cancelled	9	18	22	12	5	1	16	10
Completed	16	17	25	29	20	8	15	17
Total Active	95	108	98	97	106	124	115	112
Motor Vehicle Mechanics	189							
Entered	106	114	53	70	71	83	87	78
Cancelled	30	37	65	22	11	4	30	20
Completed	45	21	90	54	39	35	43	36
Total Active	220	276	174	168	189	233	247	269

Prince Edward Island	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**
Motor Vehicle Body Repairer	18							
Entered	20	12	12	11	12	12	4	7
Cancelled	12	8	5	2	14	5	5	21
Completed	1	2	1	1	2	0	5	6
Total Active	25	27	33	41	37	44	38	18
Motor Vehicle Mechanics	70							
Entered	34	21	23	22	25	27	22	20
Cancelled	20	15	18	7	21	5	9	9
Completed	17	5	12	15	4	12	15	7
Total Active	67	68	61	61	61	71	69	73

Nova Scotia	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**
Motor Vehicle Body Repairer	107							
Entered	72	123	49	45	42	42	48	50
Cancelled	28	35	39	24	45	23	5	
Completed	37	27	33	42	15	24	18	20
Total Active	114	175	152	131	113	108	133	
Motor Vehicle Mechanics	535							
Entered	273	207	219	166	173	229	176	190
Cancelled	86	116	118	77	106	79	78	
Completed	108	85	145	159	105	114	77	80
Total Active	614	620	576	506	468	504	525	

New Brunswick	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**
Motor Vehicle Body Repairer	71							
Entered	57	29	38	21	22	31	37	40
Cancelled	27	22	28	18	15	12	12	24
Completed	14	5	6	17	12	12	15	8
Total Active	87	89	93	79	74	81	91	99
Motor Vehicle Mechanics	450							
Entered	195	137	106	92	147	145	129	146
Cancelled	107	100	91	67	45	69	69	68
Completed	86	60	74	71	53	48	46	50
Total Active	452	429	370	324	373	401	415	443

Source: Provincial apprenticeship departments and C.O.P.S. databank

Provincial Apprenticeship Program Enrollment

Quebec	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**
Motor Vehicle Body Repairer								
Entered less Cancellations	na	368	236	192	313	233	-32	10
Completed without Certificate	114	142	117	129	115	96	53	38
Certified	83	114	129	119	167	137	75	44
Total Active	246	358	348	292	323	323	163	91
Motor Vehicle Mechanics								
Entered less Cancellations	na	2818	2698	3129	2660	2099	1817	1437
Completed without Certificate	1250	1321	1083	1256	1104	779	650	711
Certified	1632	1640	1640	1873	1612	1507	1408	1191
Total Active	3225	3082	3057	3057	3001	2814	2573	2108

Ontario	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**
Motor Vehicle Body Repairer	1577							
Entered	668	680	639	471	108	481	533	na
Cancelled	357	148	217	384	116	292	274	na
Completed	319	212	76	347	66	239	232	230
Total Active	1569	1889	2235	1975	1901	1851	1878	1702
Motor Vehicle Mechanics	7201							
Entered	2759	2566	2290	1936	522	1860	2206	na
Cancelled	1001	418	623	933	361	1330	730	na
Completed	1424	1212	355	1818	452	1236	1324	1300
Total Active	7535	8471	9783	8968	8677	7971	8123	7597

Manitoba	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**
Motor Vehicle Body Repairer	104							
Entered	46	43	53	49	42	61	66	67
Cancelled	32	18	24	25	9	7	17	26
Completed	14	16	25	19	32	24	30	26
Total Active	104	113	117	122	123	153	172	187
Motor Vehicle Mechanics	428							
Entered	136	155	144	127	94	147	124	161
Cancelled	51	38	46	56	27	37	22	57
Completed	113	119	95	91	107	78	96	94
Total Active	400	398	401	381	341	373	379	389

Saskatchewan	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**
Motor Vehicle Body Repairer	144							
Entered	82	73	50	51	57	66	48	61
Cancelled	33	18	34	69	14	50	23	50
Completed	20	19	15	20	18	12	29	24
Total Active	173	209	210	172	197	201	197	184
Motor Vehicle Mechanics	710							
Entered	216	293	169	164	170	200	170	171
Cancelled	72	140	113	117	126	206	67	195
Completed	88	91	82	80	108	79	65	68
Total Active	766	828	802	769	705	620	658	566

Source: Provincial apprenticeship departments and C.O.P.S. databank

Provincial Apprenticeship Program Enrollment

Alberta	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**
Motor Vehicle Body Repairer	627							
Entered	292	318	344	264	190	222	341	338
Cancelled	91	115	109	118	106	127	96	117
Completed	156	152	124	131	162	173	142	140
Total Active	672	723	834	849	771	693	796	877
Motor Vehicle Mechanics	2164							
Entered	945	1040	964	731	589	642	890	862
Cancelled	325	382	349	304	290	315	297	273
Completed	374	429	458	526	515	480	441	526
Total Active	2410	2639	2796	2697	2481	2328	2480	2543

British Columbia	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**
Motor Vehicle Body Repairer	361							
Entered	255	233	214	166	114	128	107	142
Cancelled	112	164	150	147	125	116	83	45
Completed	58	31	50	60	84	78	72	51
Total Active	446	484	498	457	362	296	248	294
Motor Vehicle Mechanics	1185							
Entered	615	638	640	413	340	449	398	498
Cancelled	257	341	326	310	267	239	205	89
Completed	199	209	205	272	300	318	258	169
Total Active	1344	1432	1541	1372	1145	1037	972	1212

Canada	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**
Motor Vehicle Body Repairer								
Entered	1898	1795	1628	1431	854	1038	1216	inc
Cancelled	843	663	757	914	545	686	569	inc
Completed	749	610	474	833	548	645	602	522
Total Active	3531	4175	4618	4215	4007	3874	3831	3564
Motor Vehicle Mechanics								
Entered	6911	6811	6248	5594	3743	5289	5610	inc
Cancelled	3199	2908	2832	3149	2358	3063	2157	inc
Completed	5679	5313	4573	6143	4684	5214	4938	4438
Total Active	17033	18243	19561	18303	17441	16352	16441	15200

na - not available
inc - incomplete

Source: Provincial apprenticeship departments and C.O.P.S. databank

Appendix 4.

Apprentice Program Curricula

AUTOMOTIVE MECHANICAL REPAIR - COURSE OUTLINES

LEVEL 1	Atlantic	Ontario (Basic)	Manitoba	Saskatchewan	Alberta	British Columbia
Work Procedures	Safety	Safety, locate information, service manuals	Communication, drafting, math, basic science	Safety, service information, communication, cleaning	Terminology, safety	Safety, service information, administration, cleaning
Tools	Use and maintenance	Care and use, tools and measuring devices, fasteners		Use and maintenance	Use and maintenance	Use and maintenance
Engine Theory	Description of functions and operating theory	Theory, working knowledge	Fuels, lubricants, balance			
Metal Repair	Welding & cutting, safety	Welding, soldering	Welding, soldering	Thread repair, welding, soldering	welding and cutting, safety	welding, cutting and brazing, safety
Engine Lubrication	(Engine & chassis) Oil types, greases	Theory, test,		Test, lubricants, filters, diagnose leaks and oiling prob.		
Engine Service		Remove, replace, cylinder heads valve mech.		Compression test, replace cyl. head, cam, belts&chains		
Cooling System	Pressure testing, test&replace rad, therm, coolant, belts	Theory, removal, replacement of components		Pressure test, replace components		
Exhaust System	Service & replace muffler, catalytic converter, pipes	Replace emission control sys,				
Fuel System		Theory, removal, replacement of basic components		Test, service components, adjust one-barrel carb.		
Intake System				Replace manifold, diagnose problems		
Electrical System	Test & service battery, charging, safety	Theory, removal of electronic monitoring equipment	Basic theory	Test & service battery, test & repair circuits, diodes, trans.	Introduction, battery test & service, electrical diagrams	Introduction, battery test & service, electrical diagrams
Charging System		Boost, working knowledge of components		Test, service and replace alternator		
Ignition System				Test & service points, distrib. timing, plugs, electron ignition		
Transmission		Replace clutch, linkages bearings, manual trans.		Standard service, adjust linkage	Standard assembly, service, linkages, bearings & seals	
Power Train		Operating principles, alignment fwd, rwd,		Inspection, universals, disassemble differential		
Steering System	Gear adjustment & replacement shafts & linkages			Service worm gear type, hub diagnose & align	Identifiy different systems, lubrication, alignment	Identifiy different systems, lubrication, alignment
Wheels/Tires	Mounting, balancing, rotation, bearings.	Balance assemblies		Select, balance, rotate	Mounting, balancing, rotation, bearings.	Mounting, balancing, rotation, bearings.
Brake Systems	Drum & disc service, power, bleeding & flushing	Dismantle, inspect, service components, monitoring dev.		Adjust, service drums, calipers, master cylinder	Drum & disc service, power, bleeding & flushing	Drum & disc service, power, bleeding & flushing
Suspension Systems	Spring/shock replacement suspension lubr.& adjustment	Working knowledge of comp. inspect,		Replace shocks, service components	Frame design, inspect and replace suspension components	Frame design, inspect and replace suspension components

Sources: Provincial Apprenticeship Departments

AUTOMOTIVE MECHANICAL REPAIR - COURSE OUTLINES

LEVEL 2	Atlantic	Ontario (Intermediate)	Manitoba	Saskatchewan	Alberta	British Columbia
Work Procedures		Fire safety, service procedures and manuals	Shop layout, safety, measurement			
Tools		Power tools and equipment, techniques	Use and maintenance Metal properties			
Engine Theory		Timing, 2stk/4stk theory	Principles and operations, belts, pulleys, hoses, lines		Theory, design	Theory, design
Charging System	Test & service generator					
Engine Lubrication				Service oil pump	Oil types, oil and filter change, service pump & valves	Oil types, oil and filter change
Engine Service		Cyl tests, rebuild engine	Removal, block assembly cylinder head recondition	Recondition pistons, rods, cyl. head, rocker arms	Inspect, clean and overhaul of engine components	Inspect, clean and overhaul of engine components
Cooling System		Inspect, service A/C		Diagnose problems	Diagnose & testing, flushing, component replacement	Diagnosis & testing, flushing, component replacement
Exhaust System		Knowlege and servicing of components			Diagnosis & testing, component replacement	Diagnosis & testing, component replacement
Fuel System	Theory, test, service tank, pump, line, carb, F.I., air cl.	Knowlege and servicing of fuel injection comp., diesel		Test & overhaul 2-barrel carb. Diagnose fuel inj. problems	Theory	Theory, tests, component replacement
Intake System	Manifolds	Knowlege and servicing of components			Service manifold, turbo-ch. air cleaner	
Electrical System	Theory, safety, use of guages, service of components	Diagnosis, test		Test and replace circuits and components	Theory, safety, use of guages	
Starting System	Starter test, service, replacement and prob. diagnosis			Starter test, service, replacement and prob. diagnosis		
Ignition System	Service points, plugs, switch, caps & rotors	Diagnose, replace computer control components		Service electronic ignition, distributor		
Emission Control	Theory	Knowlege and servicing of components				
Tune-up	Tests, procedures and equipment		Practice & Procedures			
Transmission		Theory, dismantling, assembly of auto. trans, torque conv.		Standard diagnosis & overhaul 3-speed auto trans. assembly service fly wheel gear, t.conv.		
Power Train		Theory, dismantling, assembly Differential, axels	Basic mechanics	Diagnose rear differential, recondition, r.axle,differential	Replace, recondition components (rwd,fwd,4wd)	Diagnosis, replacement of components (rwd,fwd,4wd)
Steering System		Theory, dismantling, assembly Power steering components		Diagnose and replace linkage, gears, power steering pump		
Wheels/Tires		4wd alignment	Bearings	Diagnose tire/wheel combination faults		
Brake Systems				Flush and bleed, resurface, service vacuum assist, diagnose		
Suspension Systems				Replace coils, MacPh. struts, torsion bars		

Sources: Provincial Apprenticeship Departments

AUTOMOTIVE MECHANICAL REPAIR - COURSE OUTLINES

LEVEL 3	Atlantic	Ontario (advanced)	Manitoba	Saskatchewan	Alberta	British Columbia
Exhaust/Cooling Sys.		Diagnose cooling system faults	Diagnose, recondition, replace			
Charging System	Test & service generator	Diagnose, recondition, replace components	Diagnose, recondition, replace components		Test, diagnose, service battery, alternator	Test, diagnose, service alternator
Engine Service		Balance engine components, replace ohc chains, fault diag.	Diagnose and recondition lubrication system	Engine removal, reconditioning assembly. problem diagnosis		
Fuel System		Diagnose and service EFI components	Diagnose, recondition, replace pump, carb, diesel,LPG	Overhaul 4-barrel and computer controlled carb.	Diagnose, test and service pump, carb., fuel injection	Diagnose, test and service pump, carb., fuel inj, turbo
Intake System					Manifold design, fuel octane	Manifold design, pre-heat air cleaner service
Electrical System		Fault diagnosis, circuit boards, battery defects	Basic circuits, instruments battery, lighting & accessories	Diagnose computer signals and sensors, power accessories	Test and repair lights, horn, power accessories	Theory, test and repair lights, horn, power accessories
Starting System		Diagnose and replace starter motor	Diagnose, test and service starter and components		Diagnose, test and service starter and components	Diagnose, test and service starter and components
Ignition System		Diagnose and replace computer controlled components	Testing and tune-up of standard system		Diagnose, test and service distributor, switch, plugs, electronic & computer ign.	Diagnose, test and service distributor, switch, plugs, electronic & computer ign.
Emission Control		Diagnose and replace computer controlled components	Diagnose and recondition		Theory	Theory, testing and servicing
Tune-up					Tests, procedures and equipment	
Transmission	Service and overhaul of clutch, Standard trans, transfer cases, automatic	Hydraulic fundimentals of auto trans., diagnose and adjust bands and linkages		diagnose, remove and recondition automatic trans. diagnose torque converter		
Heating/Air Cond.		Repair, replace switches, controls, sensors, A/C comp.		Diagnose, test and repair heating and A/C components		
Drive Train	Replacement, reconditioning of components (rwd,fwd,)	Diagnose, test and service fwd components		Correct line faults, service transfer case, fwd assembly		
Steering System		Diagnose problems		Service and recondition rack& pinion. diagnose power faults		
Braking System		Diagnose problems, power, air brakes, monitoring equip.	Diagnose and replace standard, hydraulic, air systems			
Diesel Engines						Fuel injection systems minor maintenance and repair

Sources: Provincial Apprenticeship Departments

AUTOMOTIVE MECHANICAL REPAIR - COURSE OUTLINES

LEVEL 4	Atlantic	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Engine Lubrication	Oil pumps, drives, circuits, filters, coolers					
Engine Service	Comprehensive cleaning, checking and replacement					
Fuel System				Alternative fuel systems Gas fuel injection replacement	LPG conversion	
Electrical System	Service of power accessories			Diagnose electronic instr. and computer systems	Study of new developments	
Ignition System				Diagnose distributorless ignition system		
Heating/Air Cond.	Diagnosis and service		Diagnosis and service	Diagnosis and service	Diagnose, test and repair components	Diagnose, test and repair components
Transmission			Disassemble and assemble manual / automatic trans. torque converter, clutch	Disassemble and assemble automatic overdrive trans. Diagnose electronic controls	Service and repair of automatic, torque converters, valves, governors, clutch, pumps, fwd	Diagnose, test and repair clutches, standard trans, over-drive, transfer case, automatic
Power Train			Diagnose and recondition axels transfer cases, diff'ls, shafts	Diagnose and recondition auto transaxels and fwd components		
Steering System	Alignment, power steering testing and repair		Alignment, components, wheels and tires			
Brake Systems	Air brake components and problem diagnosis					
Diesel Engines				Comprehensive tests, diagnosis and replacement of components	Principles and maintenance of fuel injection systems	

Sources: Provincial Apprenticeship Departments

AUTOMOTIVE BODY REPAIR - COURSE OUTLINES

LEVEL 1	Atlantic	Ontario	Manitoba	Alberta	British Columbia
Tools, Shop Equipment	Intro to trade, tools, fasteners, safety	Use and maintenance, safety	Safety, job analysis, tools communication, abrasives	Use and maintenance, safety	Use and maintenance, safety
Welding	O-A Principles and application, safety		Oxy, MIG, aluminum, white metal set-up and operation	Principles and application, safety (O-A, MIG)	Principles and application, safety (O-A, MIG)
Auto Body Construction	Description of functions and operating theory			Recognit'n of design, fastening panels, hardware and trim	Identification and damage analysis, measurement
Hand Skill Development				Mild sheet metal repair	Mild sheet metal repair
Paint Preparation		Part removal, surface prep. use of equipment		Use of primers, solvents, abrasives, painting techniques	
Panel Repair	Metal analysis, bending, grinding, filling		Metal shaping tools and practice	damage extent, repair skills, fenders, door, hood, rocker	Front-end panels, doors, door glass and hardware
Rebuild Methods			Threads and threading		Metal shaping tools and techniques. study of steel
Frame Repair					Mech. theory, wheel alignm't
Fitting Methods	Materials, fasteners, adjustm'ts, lubrication				Alignment, analysis, sealers, Front-end panels, doors, door glass and hardware
Hardware and Trim	Types and installation of glass, sealers, hardware	Remove, replace int. trim, glass, bumpers			
Mathematics	Units, measurements, dimensions		Related math and science metals, paint, abrasives, electr.		

Sources: Provincial Apprenticeship Departments

AUTOMOTIVE BODY REPAIR - COURSE OUTLINES

LEVEL 2	Atlantic	Ontario	Manitoba	Alberta	British Columbia
Tools, Shop Equipment	Intro to trade, tools, fasteners, safety	Use pulling equipment		Use and maintenance, safety	Review
Welding	O-A Principles and application, safety	Oxy, MIG, spot, arc, plastic, TIG set-up and operation		Principles and application, plastic	O-A Review, MIG, plastic non-ferrous aloys, arc, spot
Body and Frame Alignm't	Measurement and checking methods		Fenders, grill, bumper assemblies	Methods, measurement and techniques of fitting panels	Disassembly, rebuild methods
Body Construction	Identification of body types		Fibreglass component repair		Theory, design
Door Hardware and Adj.	Component adjustment		Repair and replacement		
Sheet Metal Damage	Analysis, preparation, straightening	Repair, reshape, panels, metal, fibreglass, aluminum			Structural panel repair
Soldering	Use and application				
Hydraulic Power Units	Use and application		Use, care and maintenance		Uses for various types of frame damage
Vehicle Support Systems		Replace and refit wiring, cooling system	Disconnect cooling and A/C systems	Identification and discharging of cooling, fuel, electrical, A/C	Identification and discharging of cooling, fuel, electricail, A/C
Damage Analysis		Determine extent of damage		Terminology, recognition of patterns	Terminology, recognition of patterns
Damage Repair		Straighten and align unit body damage, outer panels		Development of procedures based on damage	Removal of steering and drive systems
Refinishing				Application and use of equipment, mat'ls, techniques	
Plastic Welding			Thermoplastics, 2-part adhesives	Principles and procedures	Principles and procedures
Suspension & Steering					Wheel alignment, balance

Sources: Provincial Apprenticeship Departments

LEVEL 3	Atlantic	Ontario	Manitoba	Alberta	British Columbia
Aluminum Repair					Analysis, repair, finishing, priming
Panel Replacement	Repairing low crown metal		Doors, quarter, roof, trunk panel repair, alignment		Tools, analysis, roughing removal, installation, finishing
Electrical System					Theory, battery, problem ident., component replacement
Cooling System					Component recognition & replacement
Air Conditioning					Component recognition & replacement
Fibreglass & Plastics					Safety, tools, materials repair methods
Business Management		Road test, inspection client communication		Estimating, insurance forms work orders, customer relations	Estimation, costs, employee management, public relations
Refinishing	Equipment, materials, mixing priming (4)	Surface prep, equipment, hardeners, painting			cleaning, sanding, masking conditioning, painting
Frame Repair			Analysis, correction, unitized bodies, pillars	Damage ident., measuring straightening	
Chassis Components				Removal of steering, brake, suspension and power train	
Major Damage Repair		Diagnose, damage reports, appraisal, cost estimates		Planning and undertaking major sheet metal and glass replacmt.	
Body Measuring	Identification of measuring points				
Glass & Trim	Types, sealers, relacement cleaning, noise deadeners	Refit exterior trim	Glass repalcement		
Interior			Repair of upholstry, seats instrument panel, carpets.		
Steering System		Identify problems, remove and replace components, wheels			

Sources: Provincial Apprenticeship Departments